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PHYSICIANS' HALL, 11th February 1897

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ESSAYS AND ADDRESSES

J Russell Reynolds

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ESSAYS AND ADDRESSES

BY

SIR J. RUSSELL REYNOLDS, BART., F.R.S.

M.D. LOND.; LL.D. EDIN.; LL.D. ABERD.

PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON; PRESIDENT OF THE BRITISH MEDICAL ASSOCIATION; PHYSICIAN TO HER MAJESTY'S HOUSEHOLD; AND CONSULTING PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL

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TO THE PAST
AND PRESENT STUDENTS
OF
UNIVERSITY COLLEGE, LONDON,
I Dedicate
THIS VOLUME OF ESSAYS AND ADDRESSES,
BY
Sir John Russell Reynolds.

THEY were selected by him, with a number of other Papers of a more scientific character, with the intention of publishing them when he had leisure to write an Appendix to those chapters where he felt it desirable, and to illustrate the subjects from his carefully recorded experience.

This leisure never came. My husband died when the work was merely planned in his mind. I have therefore chosen from among these selected Papers, some, of general interest, the majority of which would have been published by Sir Russell Reynolds without alteration.

The sketch of my husband's life and character is added by request; it is written by one who was closely associated with Sir Russell Reynolds for five years, as his private secretary and valued friend.

If this volume should prove, as I believe it will, of interest and use to you, and serve to keep in your memory one who loved and honoured the noble profession to which he devoted his life, my purpose in publishing it will have been answered.

FRANCES RUSSELL REYNOLDS.

3, SPANISH PLACE, MANCHESTER SQUARE, W.
December 1, 1896.

A BRIEF SKETCH OF THE LIFE OF SIR JOHN RUSSELL REYNOLDS,

BART., M.D. F.R.C.P. LOND., F.R.S., LL D. ABERD., LL.D. EDIN.,

President of the Royal College of Physicians of London, President of the British Medical Association, Physician to Her Majesty's Household, and Consulting Physician to University College Hospital

JOHN RUSSELL REYNOLDS was the second son of the Rev. John Reynolds, a distinguished figure in the Nonconformist world, and the grandson of Dr. Henry Revell Reynolds, F.R.S., who was physician to Middlesex Hospital at the beginning of the century, Goulstonian Lecturer, Censor, Harveian Orator, and Elect of the Royal College of Physicians, and Physician in Ordinary to King George III. John Russell Reynolds was born at Romsey in Hampshire in 1828, and his early education was received partly at the hands of his father, who had been captain of Westminster School and classical scholar of Oriel College, Oxford, and partly at a good private school at Southampton. Having decided to follow in the steps of his grandfather and to adopt the medical profession as a career, he proceeded in 1846 to University College, London. His course at this institution was exceedingly brilliant. He obtained gold medals in medicine, clinical medicine, and obstetric medicine, and graduated in the University of London as University Medical Scholar and Gold Medallist in physiology, comparative anatomy, and medicine. With this record of successful per-ormances and a high character for industry, conscientious work, and zeal, the young physician was marked out by his colleagues and tutors as a coming man, so that it was felt by all when he decided to leave London to practise in the country that he was renouncing a future of assured brilliancy. Dr. Russell Reynolds was not, however, a man of large private means; nor was his father able to afford him much pecuniary assistance, and the opening at Leeds of which he decided to avail himself on becoming qualified was attended with peculiar advantages for him, inasmuch as he had influential friends and relations in the town to whom the details of his promising career were well known. But, hardly had he settled down in Leeds when an unexceptionable opportunity for London practice presented itself to him. His great friend and brilliant teacher, Dr. Marshall Hall, F.R.S., the discoverer of the reflex functions of the spinal chord, decided to leave London for a time, and his house in Grosvenor-street was offered to Dr. Russell Reynolds upon favourable terms. The house was familiar to him, for in his late student days he had been one of the half-dozen men who met weekly there to be less, perhaps, instructed than inspired by the prolific imagination of the greatest neurologist of the mid-century. He was at first anxious to avoid the responsibility of starting in practice in so conspicuous a manner and in so expensive a locality. He was satisfied with his chances at Leeds though the new prospect tempted him much. But his friends and his teachers were so urgent that he should lay aside modesty and come to London to command the success that lay ready to his beck that he accepted the surrender of Dr. Marshall Hall's lease of 38, Grosvenor-street and established himself there in 1852, in the house where he died forty-four years later.

He had not long to wait for professional recognition. In 1855 he was appointed assistant physician to the Hospital for Sick Children, Great Ormond-street, in 1857 assistant physician to the Westminster Hospital and Lecturer on Forensic Medicine in the school, and in 1859 assistant physician to University College Hospital. This appointment brought him back again, to his and their extreme pleasure, among his old teachers and friends, Sharpey, Walshe, Thompson, Jenner, Wilson Fox, Henry Thompson, and Erichsen, to mention a few whose names immediately recur to memory; and in this brilliant circle he was made entirely welcome, being recognised, not only as a colleague most grateful to their sentiments, but as a powerful adjuvant to the teaching resources of the institution. In 1862 he became full physician to the hospital and Holme professor of Clinical Medicine, and three years later he succeeded Sir William Jenner as Professor of the Principles and Practice of Medicine in the College.

He immediately made his mark as a lecturer. He was lucid, learned, informatory, and, above all things, original. Deeply read as well as practically expert, he knew the difficulties which lay before his hearers, and he took his own way to clear them up. With a command of French and German as well as of his own language, it was no trouble to him to find a new manner of saying old things or new examples elucidatory of old knowledge; consequently he was able to clothe the truisms with which all scientific lectures must abound, and the repetitions, without which they would be incomprehensible, in a perpetually novel and striking attire of ideas and words. And stress must be laid upon the fact that this display of subtle intelligence and verbal felicity was, as has been said, no trouble to him. Never was a lecturer less affected. Never did a public speaker hunt less or grope less for the allusion that should seem extraordinary or the quotation that should seem apt. There was with Dr. Russell Reynolds no necessity for effort and no concealed struggle—facts which accounted for the pleasure with which he was always heard by his audience. Fluently, accurately, and with absolute precision he taught his science, while, having his learning at his finger tips, his poetic similes and quaint, humorous illustrations made their natural appearance in his discourse and riveted in the memory of his hearers many a simple fact, as well as many an elaborate argument, that in the unilluminated page of the text-book had seemed without importance, or, perchance, without meaning. His old pupils to this day speak of their attendance at Reynolds's morning lectures in medicine not merely as a part of their routine medical education to which they were forced to submit, but rather as an interlude in that education from which they reaped both substantial assistance in their comprehension of medicine, absolute intellectual pleasure, and wider views of life.

Dr. Russell Reynolds's skill and eloquence were the outcome of his intimate knowledge of his subjects and the wide range of his general culture ; but that does not account for all his success in lecturing. These things would have given him the material, but his literary skill gave him the power of performance. For although, compared with many men of less eminence in the profession, he was not a voluminous writer, it was as an author that he won his spurs, and as an author that he justified in the eyes of the profession his early success as a consulting physician and his prompt election while still quite young to so many important medical posts. His first medical work was an essay upon Vertigo. This was an expansion of a short paper read before the North-west London Medical Society in 1854 and reprinted at the request of some of those present, who recognised in it a genuine contribution to medical literature. The essay marked its author out at once as an observant clinician and a well-read neurologist. It was a sketch of the development of medical knowledge concerning the causes of rotatory movement, the phenomena being for purposes of clearness distributed into "vertiginous movements" and "vertiginous sensations." Although largely an historical *résumé* the author's reflections had the stamp of an original mind, while the clearness and grace of his style contributed to the value of his monograph. This essay was followed in the course of a few months by two larger works having the titles, "The Diagnosis of Diseases of the Brain, Spinal Cord, and Nerves," and "Tables for Diagnosis of Diseases of the Brain." These constituted at the time the most clear and explicit account of the diseases of the nervous system that had appeared. It was characteristic of the author's precision and modesty that, having defined the scope of the work as a collection of what was known, he made no attempt to increase the stock of individual pathological observations. He dealt with the things that were before the profession and reduced to their proper value such semeiological phenomena as had already been recorded in connection with disturbances of the functions of the brain and spinal cord. These contributions to the literature of neurology were followed in 1861 by his book on Epilepsy. This was a brilliantly written application to medicine of the statistical method now generally followed, but introduced into medical literature by his teacher and colleague, Dr. Walshe. The book at once carried Reynolds to a position as leading authority on diseases of the nervous system, confirming him in the place left vacant by the death of Marshall Hall. The full title of the book was "Epilepsy, its Symptoms and Relations to other Convulsive Diseases,' and it was a picturesque, accurate, and forcible treatise upon all epileptiform conditions, far ahead of the general knowledge of the day, both revealing great acumen in the interpretation of obscure manifestations, and carrying the deduction from facts to the utmost length that their small amount would permit.

These treatises possessed the same qualities that we have noted as characteristic of the verbal addresses—in fact, he imported into his lectures the precision of style and wide range of learning that he had cultivated in his writings. He was author first and lecturer afterwards. This may be seen in his Lectures on the Clinical Uses of Electricity, which appeared in 1871, and which are the only examples of his lectures which were ever printed for public circulation. At this date but little was known of electricity in its application to medicine or physiology. There were no electrical departments in connection with the general hospitals, and the lectures, when they appeared were a revelation to the profession of the workings of what might almost without exaggeration be termed a new therapeutic agency. They presented the subject from the side of practical medicine, not from that of electrical science which had dominated some writers to an unpractical degree. But they would never have been printed had it not been that Dr. Reynolds's most assiduous and brilliant pupil at the time asked him one day when the course was completed why he did not publish his lectures on electricity, seeing that the subject was one on which the profession badly wanted instruction. Dr. Reynolds confessed that he shrank from the trouble because the lectures had been delivered from notes only and no real manuscript existed. "I can bring you the manuscript in the course of a few days," said the student (who was W. R. Gowers), "for I have taken down your lectures *verbatim* in shorthand as they were delivered."

In 1866 appeared the first volume of *A System of Medicine* under Dr. Russell Reynolds's editorship, and published by Messrs. Macmillan and Co. The science of surgery had some two or three years previously been summed up by the greatest British authorities under the superintendence of Mr. Holmes, and it was widely felt that a similar work on medicine was required; but it speaks very highly for Reynolds's reputation in the profession that at his age, and having been full physician to a general hospital for but one year, he should have been able to surround himself with a brilliant staff of representative medical authors. He discharged his own share splendidly. He wrote several admirable and lengthy articles; for instance, those on Erysipelas, Epilepsy, and Hysteria, but especially he excelled in his general introduction. This was the ablest summary of the existent conditions of medicine that had appeared. It dealt successively with the definition and nomenclature of disease, its natural history and diagnosis, therapeutics, and hygiene. The editor made no attempt to dogmatise. He laid down the principles on which a systematic treatise on medicine should be written with a happy union of philosophical acuteness and practical common sense. No one more thoroughly realised the insufficiency of the nomenclature of that day than did Reynolds, yet he furnished good reasons for compromise in the matter. Obvious mistakes must be corrected, but old associations must be respected. These were his extremes and he found the mean. In the passages devoted to the consideration of what is meant by symptoms of disease he rose to a very high level of philosophical discussion without for a moment losing his peculiar clearness of expression. It would be impossible to imagine a more beneficial corrective of loose style than the marshalling of his arguments; and as *The Lancet* of that date said on the appearance of the first volume, "Many hard-worked medical men whose soul has often fainted within them when wandering in the howling wilderness of medical nosology welcomed with relief the simplicity of his scheme of classification." The *System of Medicine* took over ten years to complete, and the amount of trouble as well as literary labour that it entailed upon its editor was very great, in spite of the help he received, for the first three volumes, from the late Dr. Anstie, and for the last two from Dr. Gowers. He rightly allowed his staff free speech, but they took advantage of his genial administration and were unpunctual with their contributions and not careful to avoid the limitations in space laid down for them. The great work suffered by the delay, as the sense of cohesion so perfectly suggested in the editorial foreword somewhat evaporated, while several repetitions crept in; but further exceptions to Reynolds's *System* have never been taken. It was a record of the science of medicine in its day, and many of its sections have been of permanent value to the profession; it was, in short, a great work, planned with boldness and due regard to order, and executed with thorough efficiency.

To return to Dr. Reynolds's purely profession career, having proceeded to the degree of M.D. Lond. in 1852, he was elected a Fellow of University College in 1856 and a Fellow of the Royal College of Physicians of London in 1859. In 1868 he was appointed an Examiner in Medicine in London University for a period of five years, and in 1869 he was elected a Fellow of the Royal Society at the instance of his teacher Professor Sharpey, supported by, among others, Professor W. B. Carpenter and Sir William Fergusson. At the Royal College of Physicians of London he was appointed Lumleian Lecturer in 1867, Censor in 1878, and Harveian Orator in 1884. The Lumleian Lectures and the Harveian Oration orm a remarkable contrast in their style and in intention and illustrate well Reynolds's wide range of thought. The former had as their title "On Some Points in the Relation between Medical and Legal Practice," and were a good example of his simplicity and lucidity in dealing with matters of fact. The subject was one that interested him much and he returned to it later with a *brochure* entitled, "On the Scientific Value of the Legal Tests of Insanity," in which he dealt thoroughly and not very flatteringly with all the *criteria* of insanity upheld by the Courts, but he felt that it was one for assertion rather than speculation—one in which his task was to make things clear by the directest methods. The Harveian Oration, on the other hand, was a brilliant essay on the progress of medicine, full of original thought and beautiful simile, elaborate and eloquent, and terminating in a noble estimate of Harvey's character as a religious man, although an unfettered seeker after truth. It was a fine piece of high thinking expressed in appropriate words, but it was not absolutely simple reading as those who peruse this volume may find.

In 1878 Dr. Russell Reynolds was appointed Physician to the Household, a post in which he earned the gratitude of many of Her Majesty's old servants as well as the esteem of his Sovereign; in 1884 he became consulting physician to University College Hospital; in 1890 he was appointed Senior Censor of the Royal College of Physicians of London; and in 1893 President of the College in succession to Sir Andrew Clark. Among the many congratulations which immediately poured in on him from his friends and from all grades of the profession at home and abroad one should be especially mentioned, the kindness of which much gratified him, not only on his own account, but because it reflected honour upon the College and upon the whole profession. It was from the Queen and ran as follows:—"I wish to congratulate you upon your election as President of the College of Physicians." On New Year's Day, 1895, he was created a baronet, and in the same year he was elected President of the British Medical Association and received the honorary degree of LL.D. from the University of Aberdeen. The University of Edinburgh conferred a similar honour upon him in 1896.

For his tenure of office as President of the Royal College of Physicians of London no one had anything but words of warm praise. He was business-like, punctual, observant, and restful. The deliberations over which he presided took their tone from him, and this tone greatly facilitated official labour: he did not spare himself and made the wheels run smoothly for others.

Sir Russell Reynolds, had now reached the highest positions of honour and responsibility in his profession, and his life having been thus full and arduous, his friends were looking forward to the time when he should consider that the call of duty no longer precluded him from seeking a well-earned leisure. Not that for such as he freedom from the duties of office and the cares of practice would have meant idleness. Far from it. But it would have meant a period in which his time would have been his own to use as he chose—a form of leisure which it had not been his lot to enjoy for fifty years. That he would have turned aside now and again from medicine and pursued the arts of music and painting, in each of which he was an amateur of no mean proficiency, is probable, but the medical profession would also have benefited directly by a prolongation of his life. It was his intention to give to the world at the earliest possible date, some of the results of his enormous practical experience, in the form of a volume of scattered essays. He loved writing and was an artist in words. Therefore his literary output during his working life was, on the whole, small, for he required a certain aloofness from daily routine before he could make his pen serve faithfully its poetic and fastidious master. The projected volume, of which this volume, as explained by Lady Reynolds in her dedicatory letter, is but a small portion, would have been a collection of addresses, speeches, and papers already published but with appendices bringing each chapter up to date, and adding the fruit of nearly half a century's assiduous practice in hospital ward and consulting-room. That such a book would have had a deep and abiding interest for the profession is very sure, but the bitterness of death interfering with the fulfilment of his design is not in this instance undiluted. Had Sir Russell Reynolds required such a monument to his memory, it would have been sad that he should have died before its erection, but apart from his high official positions—indeed, decades before he reached them—he had earned for himself a secure position in medical history. His early writings were far in advance of any previous attempts to systematise the symptoms arising from nervous lesions. He appeared at a transition period, when order was just discernible forming itself out of chaos, and he was largely responsible for that order. Five or six years before the paths of microscopical investigation had been made plain by Lockhart Clarke, Reynolds was working at the clinical aspect of diseases of the nervous system, and perfecting the knowledge and proving the surmises of Marshall Hall. Later a flood of light was to be thrown on these subjects by the philosophical lore, the research, and the clinical teachings of Hughlings Jackson, Bastian, Ferrier, Gowers, and Buzzard; but during the interval the torch was held aloft by Reynolds. He laboured at his subject, he interested as well as instructed others, he made things plain, so that his successors could start with ease where he left off, and he rescued the manifestations of hysteria and epileptoid conditions from the curious uncanny kind of mystery in which they were shrouded, and showed them to the whole profession as simple results of cause and effect. These were great accomplishments, and Sir Russell Reynolds, denuded of official and Court dignity, of his prestige as a writer, his reputation as a lecturer, and his claims upon the public as a general physician, would still remain secure of his fame as a pioneer in the science of medicine.

It was because of his early success as a neurologist and his abiding interest in the nervous phenomena of disease that the profession and the public alike decided that he should be a specialist; but a specialist he never was, and in its limited sense he repudiated the character very strongly, arguing that any success he might have achieved in particular walks was entirely due to the fact that his work had been thorough, comprehensive, and general. As has been said, one of the subjects in his *System of Medicine* on which he chose to write himself was Erysipelas, and as a clinical teacher he was every whit as effective and as instructive when discoursing on diseases of the lungs or of the heart or acute specific diseases, as when dealing with the branch of medicine with which he was supposed to be most familiar. He carried his characteristic width of knowledge into all his work, and the practitioners who knew him best had equal reliance on his judgment in all classes of disease.

This sketch of the life of Sir Russell Reynolds would be incomplete without a brief presentation of his private character. He was a rigidly strict man in his code of honour, but full of kindness and sympathy. He was an exceedingly affectionate friend, but not at all a man of promiscuous friendships. High-minded, sensitive, and physically delicate, he shrank from the companionship of numerous persons to whom he was willing to be just, of whose merits he was appreciative, and whose interests he would take endless trouble to serve. But many of these he could not admit to intimacy, his standpoint in so many of the details of life being different from theirs. Studiously grave and quiet in his manner, those who did not know him well might have mistaken him for a melancholy man. And it would have been a mistake indeed, for all things, save a very few, he was ready to regard in a humorous light, while his conversation and his writings were full of witty allusion and quaint illustration, and he was never happier than when he found himself the cordial host to a group of congenial friends.

For religious effort of thought or deed he had the sincerest respect. A friend (not of the medical profession) who knew him intimately for more than the last thirty years has written thus concerning him, and it would be impossible to improve upon this estimate of Sir Russell Reynolds:—" Of all the men whom I have seen with their armour on or off he will ever live in my memory as most keenly sympathetic. Nothing personal put him out, and yet this came from no apathy of temperament, for he was quick in responding to every phase of life, but from sheer power of apprehension and ability to see in a glance that something could always be said on both sides in a crisis which other men might take time to disentangle and so be drawn into hasty or complacent utterance. Though eminently tolerant and tender-hearted Dr. Reynolds was not a man to make things pleasant or speak smoothly when he smelt dishonour, duplicity, or injustice, for he had no respect of persons and delivered his mind when occasion arose with unmistakable distinctness. He was, moreover, thoroughly unselfish, putting himself, for instance, to continuous trouble in a case of the most commonplace suffering if he thought he might be able to mitigate it. And when a friend was ill, though not necessarily a patient, his loving tenderness was enough to make the sufferer think that Reynolds had no other claim upon him or drain upon his time. And he was as generous with his purse as with his power, and wise though free in his charity. . . . In setting sadly down a few of the things which crowd my memory while thinking of the sorrow now fallen upon his family and so many beside myself, those who knew him best feel it to be mitigated by the remembrance of the high motives which were plainly behind all that he said and did. They know, moreover, that his incisive scientific perception was associated with a profound sense of those hidden laws of life which elude analysis, but cannot be disregarded by genuinely intellectual minds. He was moved and strengthened by the deepest Christian faith, of which he made no reproachful display, though he never shrank from openly claiming it as a true support of his life and work, being a devout worshipper and communicant at his chosen church."

It only remains to add a few words concerning his last illness. During the whole of 1895 he was undoubtedly overworked. He suffered severely from influenza in March of that year, while he was prevented through his numerous engagements, official and private, from securing a much needed rest. Though with somewhat of a struggle, he succeeded in discharging conscientiously his double duties as President of the Royal College of Physicians of London and of the British Medical Association, and left London in the autumn. In November he again fell a victim to influenza, but returned to his work before Christmas. At the beginning of 1896 he went to Hastings, and returned somewhat stronger and feeling himself more apt for work. But the improvement was of short duration, the physical weakness increased, and at the advice of his friends he decided not to offer himself for re-election on March 30 as President of the Royal College of Physicians of

London. Again he left London, and again returned feeling better, so much better, indeed, that on the day of his return he saw patients and made appointments to see others. But a week later on returning from a drive he slipped on his own doorstep and bruised his ankle severely. The injury was sufficient to compel him to keep his bed, and from that time he went steadily down, slowly at first, but at the end rapidly. Until the last week or so of his illness he preserved his faculties, but the intellectual capacity was badly served by the extreme physical failure. The end came on Friday, May 29th, when he died peacefully and painlessly without a struggle in the presence of his devoted wife, who never left him for a moment during his long illness.

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ESSAYS AND ADDRESSES

ON THE RELATION OF PRACTICAL MEDICINE TO PHILOSOPHICAL METHOD, AND POPULAR OPINION:

Being the Annual Oration, delivered before the North London Medical Society, on February 10*th*, 1858

Mr. President and Gentlemen,

As set forth in the laws of the North London Medical Society, the Annual Oration shall contain a retrospective account of the advance of practical medicine during the preceding year; but it is not provided in those laws that practical medicine shall advance. Such a contingency as the arrest of development, was evidently not contemplated by those who constructed the framework and rocked the cradle of this Society; and when it drew its first infantile breath, and exhibited an energy of purpose and vitality, such as precluded the idea of mal-nutrition, spontaneous gangrene, rickety collapse, loss of members, and other "ills that flesh is heir to," its sanguine parents, nurses, sponsors, and law-makers had their hopes unclouded by any prognosis of retrogression in the family of societies and sciences to which this new and vigorous member was introduced.

For a time the infant progressed favourably, and there was no room for fear. It grew, as all organisations do, by the assimilation of raw material, and the excretion of waste products; but after a year or two had passed, its health failed and ordinary treatment did no good. Change of residence was recommended and adopted, but with no great measure of success; and at length it was brought back again to its native air, in which it now enjoys a tolerable amount of comfortable vitality.

Considered in relation to other members of the somewhat large family of societies, this has contributed a fair proportion of work; and, for an individual of its age and opportunities, it has advanced the general reputation of the scientific stock from which it sprung. But when we come annually to regard the advance which practical medicine has accomplished, we do not limit ourselves to this child of its old age, nor must we take for granted, because science is a year older, and perhaps a size larger, that it is necessarily either wiser or better than it was; but we must examine it carefully, and ascertain whether it has improved or advanced at all, and if so, in what direction; whether it has retrograded, and if so, for what cause.

In the "Oration," which it is my honour to deliver now, I purpose to depart somewhat from the usual custom of this Society, and instead of pointing out the advance of practical medicine during the past year, I will review the present relation occupied by medical science to general philosophical persuasion on the one hand, and to popular opinion on the other; explaining, so far as is within my power, and within the limits of your patience, the causes which operate in producing an advance or retrogression in the scientific position of our profession; and also those which raise or depress it in popular esteem.

In thus departing from the letter of the laws of the Society, it does not appear to me that I wander from their spirit; but if I lay myself open to that charge, my excuse must be that my place to-night was to have been filled by one who would have complied with the laws in both respects, but whose removal from London has occasioned a loss to this and many other societies, which will not be readily supplied. Mr. H. Burfoed Norman, whose counsel and character we honour, whose friendship we value ; and for whom, with an increase of acquaintance we have always felt more than an equivalent increase of respect. Mr. Norman, had he addressed you, would doubtless have recalled to your minds the important additions which have been made to our knowledge during the preceding year ; but in his absence I must ask your attention to a somewhat more extended, perhaps more important, but I fear to many, less interesting theme.

If we come to regard the relation of practical medicine to general philosophic speculation ; or, in other words, the prevailing philosophy, or general method employed in scientific medicine, there is much deserving our attention. We must, for the time losing sight of minor points, some amiable weaknesses, and many individual peculiarities, endeavour to discover what is the actual predominant idea, principle, or tendency of the scientific mind. We have not to state what Dr. This or Dr. That may do in a particular case, for it may often happen that those well-known practitioners themselves would find as much difficulty in squaring every dose of "James's Powder," or every application of "water-dressing," with any general philosophical idea, as they would in "squaring the circle," or arranging some neat little apparatus for "perpetual motion." But we must discover what is the prevailing direction of their minds, and of the profession at large, when reasoning with themselves, or consulting with one another in ordinary, and more especially in extraordinary cases. The extraordinary cases illustrate the tone of mind more efficiently than the ordinary, because, for them, mere routine is of necessity disregarded. We cannot at once untie those little metaphysical red-tape parcels of prescriptions which we carry about with us, *in posse*, in our heads ; but we have to apply, deductively, to new combinations of phenomena, certain principles we have somewhat laboriously gathered ; we have nothing ready-made at hand ; we have to invent new formulæ, and thus bring up to the work our past experience, and employ it according to our present and prevailing method.

There can be but little doubt that practical medicine, or medicine considered as an art, has now been for some years, so far as the profession itself is concerned, striving to become scientific; that the object has been to guide the art, and advance it by the science; to discover a scientific basis for the operations and appliances which have been accidentally or empirically employed. In some cases this attempt has been successful, in others it has not; but the profession has not ruthlessly thrown away all that it could not reduce to system, and it would be difficult, even now, to say why we do many things we do; but science in days gone by was led by art, and now the former would take the lead. It is not in medicine alone that science and art have thus changed positions. The same alternations have been observed in music, agriculture, painting, and architecture. Sometimes the one has been blind, and the other, with both eyes open, has led it on its way, cured its eyesight, and in return been blinded for its pains, but also conducted onward with more or less kindly offices; sometimes the leader, whichever it has been, has wandered and lost its way; sometimes the blind has led the blind, and both have fallen into the ditch.

Various have been the relations of scientific medicine to applied or practical therapeutics. Various are the relations at the present day. There are the philosophic doubters, the employers of the "expectant" medicine, and nought beside; and there are the ignorant charlatans, bone-setters, and general pill-vendors, who can show you the tubercles that their pill-victims have expectorated. The art, with its immediately perceived practical results, is always the stronger motive influence for the many. Sometimes it breaks loose from all restraint, and disports itself easily when unrepressed by any force but that of its own personal convenience. Sometimes it has been so held in by the reins of scientific dogma, that nothing but retrogression or backing, and that of ungainly aspect has been achieved; but sometimes, and such is the case now with the greater portion of the medical profession in England, the art, the strong motive power, has been broken in, guided and encouraged forward in a good path, and towards a successful end, by the steady hand and practised eye of science.

But, granting that the advance of practical medicine is thus directed by a scientific aim, what is the relation of the science of medicine to other sciences, and to that general method, the *scientia scientiarum*, our prevailing philosophy? What is the principle, or plan, or "method," underlying all the sciences, and directing the present progress of scientific medicine?

To answer this question we must not look merely at the practice of individuals, nor at certain ephemeral productions of medical literature; which are as hybrids, unproductive hybrids, between science and commercial speculation. These showily dressed-up volumes of medicine-made-easy, which tell the profession nothing, and the public only something of which ignorance would indeed be bliss, are no better types of our scientific position than are the advertisements of fifty thousand cures by some delightful farinaceous compound of bean-meal and saw-dust. But we may judge from the introductory lectures of our teachers, and from their systematic courses of instruction; from the general character pervading the better contributions to the periodical press; from the materials for and mode of discussion adopted at our societies; from the more solid portion of our literature; and from the daily practice and habit of thought adopted by the great bulk of the profession.

Judging from all these sources, the undoubted impression would be that our general method is that gradually developing from the time of Bacon and Descartes, but now assuming a more distinct form, and possessing the name of Positivism. Whether we call it by that name or any other, or by no name at all, it is evident that the spirit of so-called Positivism is penetrating all our scientific work, and directing the course of our medical inquiries.

It is not my intention to enter upon any discussion of the merits or demerits, the wants supplied, and the lacunæ left unfilled by the system of positive philosophy; I will limit my observations to those features of that system which specially influence our own professional study.

The two which exert the most considerable effect are the classification of the sciences and the general method adopted with regard to each of them.

One of the most difficult problems of philosophy has been the classification of the sciences; and although numerous attempts for its solution have been made by profound thinkers of antiquity and of modern times, as yet no thoroughly comprehensive system has been developed. That some of the sciences are closely related to one another we may daily recognise; we can scarcely speak of any phenomenon or process belonging to some without entrenching upon and using the language of others. For example, the processes of life, such as digestion, respiration and the like, require a knowledge of physics and chemistry, not only for their comprehension, but for the expression of their simple facts; and again, neither physics nor chemistry can be said to be exhausted until we have developed them into animal mechanics and organic chemistry.

The sciences of physiology and pathology are, to a certain extent, compounded of chemistry, mechanics, and general physics, together with astronomy, so far as it relates to the climatic conditions and variations in animal life; and the history of these sciences presents us with ample illustration of the Eidolon pointed out by Bacon, that "some men become attached to particular sciences and contemplations either from supposing themselves the authors and inventors of them, or from having bestowed the greatest pains upon such subjects, and thus become most habituated to them;" and, further, that "if men of this description apply themselves to philosophy and contemplation of a universal nature, they wrest and corrupt them by their preconceived fancies."

At one time, when chemistry received a strong impulse from the influence of Paracelsus, De la Boe, Sylvius, and others, every vital process was referred to chemical agency; and thus in the most unscrupulous and often clumsy manner, fermentation, effervescence, ebullition, and other not very easily-imagined changes in the animal fluids were held to account for all the phenomena of life, both in health and disease. But again, mechanics rose to higher dignity than heretofore, and the curves, angles, and forces were found to be equally satisfactory solutions. With German metaphysics arose new explanations, and every physical fact was found in dependence upon some higher metaphysical fact, of which consciousness was the only witness. Physiology, previously the offshoot of chemistry or mechanics, subdivision of those larger sciences, had now to take its place as an underling of psychology. Whence to start from, and towards what goal to direct inquiries in the study of physiology, were questions asked often, and thus variously answered. A satisfactory answer could only come from a true classification; such an arrangement of the several elements of study that this one should occupy its proper place.

The result of the thought and teaching of the last quarter of a century has been, practically, to place the science of biology (by this term including all vegetal and animal anatomy, physiology, and pathology) in the position which is claimed for it by the positive philosopher, and which may be seen in the following order of affiliation of the sciences: mathematics, astronomy, physics, chemistry, biology, sociology. It thus becomes the connecting link between general physics and chemistry on the one hand, and social science on the other.

The principle of order adopted in this arrangement is that, starting from mathematics, we have the most general and least dependent first, and that each of the others is successively dependent upon those which precede it, the order being one of increasing complexity, speciality, and dependency. Any one may be understood without those which follow; no one can be entered upon without some knowledge of those which go before.

This is the point to which we have practically arrived in our medical education. We learn some mathematics and astronomy at school, and we enter upon a study of physiology through the doorways of physics and chemistry. We leave psychology out of the question, or have it brought in, so much of it as can be dragged in, in a few lectures on the functions of the brain, or still fewer on diseases of the mind.

Thus the student who is sufficiently "well-up to pass" enters upon his career of practice, in which he has constantly to deal with life—life in its thousand-fold phases of health and disease, so played upon by mind and emotion, that we can never fully appreciate, and perhaps never over-estimate the influence of those unseen powers; and yet he often enters upon this work without so much as a notion upon psychology, and with ideas of life built up only of anatomy, chemistry, and physics.

The idea of life—that it is merely a modification of general physical forces—is gaining ground, and seriously affecting both our teaching and our practice. It is not a part of the positive philosophy, but it is often the result of the "positive" method, and of the system of classification, and sometimes of a bungling of this with the idea of the correlation of forces, or with the notion of some central, single force.

The progress of science tends to show unity of plan amid all the marvellous diversity of nature, to evoke order out of chaos, and harmony from discord; but it should ever be borne in mind that analogy is not identity, and that harmony is not unison; and that although we may gain glimpses or hints of order, harmony, and unity, a perception of it in its real nature is quite as distant as it ever was—as far from the author of "Nomos" as from the Grecian Thales.

Isomorphous salts are not identical, although they possess many properties in common; there is still the differentia—their primary chemical constitution—which cannot be broken down. Vital and physical forces are not shown to be identical, although they bear many striking resemblances; there is as yet the persistent differentia of life, which cannot be resolved. Is it said that you may trace life downwards until you find phenomena between which and certain chemical and physical changes you cannot draw the line? I may reply that Regent Street and Oxford Street cross at one particular point, and sitting on the lamp in the middle of the Regent Circus, it would be difficult to say in which street you were; but they are not identical, although they meet; and, on the other hand, you may trace life upwards, from its lowest forms, until you find it in the consciousness, the higher thought, and aspirations, of humanity, the reference of which to simple or complex physics is as impossible for the mind to accomplish as it is for it to descry the difference at the other extreme.

But it is not the idea of some central or universal force, the diverse manifestations of which result here in physical, there in chemical, and elsewhere in vital phenomena, which is the most dangerous and delusive notion; although in order to arrive at some good-looking generalisation many have tortured facts, magnifying some, and diminishing others, dressing up one class, and not only stripping and shaving, but actually flaying others, until they might fairly challenge their most intimate relations to swear to their identity. It is not this generalisation, to arrive at which a kind of scientific steeplechase has to be ridden, leaping over obstacles, and getting out of the way of great chasms, which must inevitably sink the rider and his steed byond all reach of mortal eyesight. It is not this generalisation, which, as a goal, may be well enough, but which as an imaginary .hobby-horse is a most unsafe instrument of progression, that we have to fear; for it may be, when duly regarded, a useful stimulus of well-directed work; but it is that other principle and system with which it is so often confounded, and in exclusive satisfaction with which it so often ends, namely, the entry upon the study of life through the material side alone, and the resting contented with such explanations of vital phenomena and processes as extend only to a definite and accurate statement of the physical and chemical elements which enter into them as component parts.

It is not for a moment intended by these remarks to underrate the importance of accurate physical and chemical examination. Wherever physics and chemistry can explain even a part of a vital process, they should be used for that purpose, and used to the full; but the great fact we are in danger of losing sight of is that a process is not explained when only a part of it is detailed in any terms, be they physical or chemical, even though they are conveyed with accurate measuring and weighing, to the thousandth part of a grain or the ten-thousandth part of a line. In regarding the process of digestion, for example, nothing is to be gained by the imagination of some imperial "Archæus," seated upon his gastric throne, and wielding the sceptre of royal digestive state; neither is anything gained by supposing a mysterious "vital entity," or still more unimaginable "vital intelligence," or "vital force," degrading itself from its high position to do the low-caste work of a chemical underling; for now we know that the process is one, the immediate changes of which depend simply upon the exercise of ordinary physical and chemical agencies; and, moreover, that the said agencies are (unlike many functionaries) quite equal to their work, and can accomplish it outside the body, and without any vital drilling, interference or overlooking. But when we have separated Pepsine, and even converted it into an article of diet, thus bringing up a valuable contingent to the support of an exhausted stomach; when we have determined its atomic weight, and bestowed upon it the due measure of its titles, that real "reward of merit," its C.H.N.O.; when we have analysed its compounds, and become thoroughly acquainted with the forms and limits of action of its most valuable "adjutant," the gastric acid; when we know all the "peptones," and can say how pepsine may, with an alkali for its assistance, change its colours, and come down, as by a flank movement, upon the unsuspecting amylaceous compounds; when we have accomplished all this, and much more beside, and have numbered the hours that the engagement between gastric forces and various viands must occupy; when we have definitely weighed the compounds, enumerated the casualties, and estimated the waste products that rise in air, is there nothing left for us to study; is there nothing that has escaped us; nothing that we have left unweighed; nothing that we have failed in reducing to our formulæ? Is the physiology of digestion summed up in this expression of chemical results? What is there that determines the sense of hunger, of thirst, or of satiety, and how do these influence the chemical transpositions? What is the nexus between thought, sleep, anxiety, or other emotional disturbances, and those sensations; and through them, or not through them, upon this easily described action of the pepsine and its assistant acid? Where do mind and feeling come in contact with these material processes, and how do they mutually exert their action and reaction? What fits the carnivorous stomach for its food, the herbivorous for its work? How and where is the relation between them, and the dental apparatus? Outside or beyond the most simple chemical results we are at once arrested by a hundred questions, as yet unsolved, and as far, apparently, from solution as they were when first suggesting themselves to the human mind. Partial answers may be given, *i.e.*, we may advance the problem one degree further from the most easily observed phenomena; but a great gulf comes between us and the final answer;. and divide as we will the narrow ground that lies between our starting point and the margin of that gulf; laboriously measure as we like, and accurately name every step of the process from the first rough fact to that brink, reached in the ages long since passed without such fine calculations, we do not by such means fill up the gulf itself, nor have we yet discovered even a plank wherewith to launch out upon the dark sea that comes between the material and the immaterial; the seen and the unseen.

We have not to undervalue, or reduce in importance, the information already gained of and from the examination of the material and physical forces; but what we have to do is to guard carefully against mistaking their real import, imagining them of far greater value and extent than they really are, and of disregarding the facts and processes which are revealed to us through consciousness alone. At the one extreme is consciousness, at the other physical and chemical phenomena, and they are placed in mysterious relationship; the one class is as real as the other, and we have equally to value both; and in order to arrive at any correct general physiological principles, we must start from the two grounds, and proceed from what is known in each to what is unknown between the two.

But, instead of this, what do we do? We often rest satisfied with but one-half of physiological facts. We imagine, and our students are often taught to imagine, that the physiology of respiration is exhausted when they have learned how many cubic inches of air constitute the vital capacity of the thorax, and how many are exchanged in ordinary breathing, how much per cent. of oxygen is taken in, how much per cent. of carbonic acid is thrown out ; what muscles expand the thorax, how the air is squeezed away from the pulmonary vesicles, what nerves act upon the muscles, and so forth. Again, the student often feels satisfied when he can find a parallel between the galvanic battery and the nervous system, and can apply some such mysterious word as "polarity" to both. In short, there is a species of contentment, the very reverse of that which will lead to further investigation, in knowing accurately some ponderable and measurable facts ; a strong temptation to suppose that these constitute the whole instead of only a portion of that which has to be known ; and, further, a great disposition to think that the whole is already known.

Now this mode of viewing life and vital phenomena is, I think, the very reverse of an advance. Organic chemistry and animal mechanics are carried forward, but the science of physiology remains behind, and unless there is an advance in physiology and pathology there can be no real advance of practical medicine.

Considered further, the results of this system, in so far forth as it depends upon classification, are to be seen in the undue regard paid to anatomy, both structural and descriptive, in relation to physiology, and in the overweening attachment to morbid anatomy in regard of pathology. Again, the same tendency exhibits itself in the attention paid to physical signs of thoracic disease as compared with that bestowed upon symptoms ; in the disposition to use the results of statistical information derived from a study of the many rather than to interpret the phenomena of an individual case ; in the degree of satisfaction which is felt in merely recording certain chemical results, such as those which may be observed in diabetes, Bright's disease, and the like, rather than in arriving at some idea of the instances under examination in relation to the disease itself; and, again, in the employment of medicines whose *modus operandi* can be more or less readily explained on some chemical or physical principle.

Now, in all these cases, there is a good in the method employed; there is, or may be, accuracy to a certain extent; but the harm which arises is from the limitation of inquiry, and of the spirit of inquiry to this one-half of the phenomena.

It has always appeared to me that a vast amount of valuable time is literally wasted upon anatomy, and especially upon that branch of it termed "descriptive anatomy." Of course, it is needless to say that for the operative surgeon such a knowledge of "surgical anatomy" as shall render him competent upon any emergency to know with what elements he has to deal is absolutely necessary; and again, for the physician, a knowledge of visceral anatomy is requisite; but what useful end is obtained by a laborious taxing of the memory by all sorts of artificial devices, by V.A.B.'s and B.O.D.F.I.'s, in order to "get through an examination" in which the candidate is expected to know the distribution and relations of every nerve, filament, and vascular ramuscule, the origin and insertion of every muscle, the course and contingencies of viscera, and parts of viscera, which never come under the surgeon's knife, and are always hidden from the physician's ken, I am at a loss to conceive.

As a mere exercise of memory it is not a particularly good one, for it is of such a nature that four-fifths of it is lost as soon as the examination is over; and, further, the boy at school should have educated his memory, and the student should not have to waste one-half of his ordinary three years curriculum of proper professional study by a mere gymnastic exercise of mind.

I do not think I overstate the amount of time which is commonly devoted to anatomy. The first three months of the first term are bestowed upon "getting up the bones," and learning all about their ossification, epiphyses, and what not; the best part of the second three months is devoted to dissection of the muscles, fasciæ, and ligaments; physiology is thrown in as a makeweight, as something to give an hour to daily; but the "first year's man" is not to "bother himself much about physiology," he had "much better get up his bones;" they are "particular about bones at the Royal College." With dissection and lectures the most valuable portion of the second year is spent again upon anatomy. Lectures on medicine, surgery, and physiology also come in, but to be "strong upon anatomy" is the aim, and with a mind tired by endeavouring to remember the ins and outs, and ups and downs of every artery and nerve, but a jaded attention is given to medicine; and the "second year's man" sees but little way into physiology; for he devotes himself to surgery, as it comes more in his path, and is more immediately perceived. Again a considerable portion of the third year is expended in "grinding" up anatomy for the examination, until the edge is sufficiently fine to cut its course through the Court at Lincoln's Inn, and to be blunted down into uselessness by a few congratulatory dinners upon having "passed."

What is the good of all this? I have often asked, but have never yet received a satisfactory reply. How much of minuter descriptive anatomy do we, any of us, remember? How much less do we find of real value to us in our daily work? How should we stand a stiff examination now? We should, many of us, positively flounder on our "bones!"

For those who intend to graduate at universities, or to take honours wherever they may be, there can be no doubt that the field of anatomy is an ample and noble one for emulation and distinction; but for the practical use which is made of anatomy in after years, I believe that six months' genuine work would be fully sufficient, and the ordinary student would then have time to ground himself well, instead of "grinding" himself wretchedly, in physiology, pathology, medicine, and surgery.

Now, I know from my own observation, that many have commenced the practice of their profession who could tell you the origin and insertion of all the muscles, the relation of all the arteries and nerves; who might distinguish corns from cancer, or "take up" the radial artery if required; but who could not diagnosticate measles from scarlet fever; who know nothing whatever of diseases of the skin, nothing of mental disease, and who would find it difficult, except by mere guess, to distinguish pneumonia from bronchitis!

But again, the prominence given to morbid anatomy in the general study of pathology is an illustration of the same tendency, and also of its injurious results. A knowledge of structural changes is of very high importance, but it is not of exclusive value. Acquaintance with the nature of organic lesions, their causes, natural history, sequence and results, is of real assistance in practical medicine only when combined with etiology from the other side, a knowledge of symptoms and of general dynamic changes. But now we often see men who can discuss the quality of myeloid tumours, and talk very learnedly upon cells, nuclei, and degenerations, upon what is carcinoma, and upon what is not; and yet whose opinion of a case during life would be of value in inverse proportion to the accuracy of their microscopical delineations.

In practical medicine what errors have we not seen from an exclusive attention to bruits, rhonchi, percussion notes, and the like, when those have been set up in value above the general, vital phenomena, whose perception and valuation is not quite so readily attained!

But it is unnecessary to multiply examples, for the direction of the professional mind at the present day, doubtless commencing in a healthy reaction against traditional nonsense and time-honoured empiricism is sufficiently evident; but that which is the ground-work of the erroneous and extreme development of this reactive movement, that wherein lies the error from which its evil results will spring, is the position given in our minds to the science of physiology, viz., as a science to be reached only on the material side; a position in some instances the result of extended and profound philosophical consideration; but in many others, one which physiology has acquired through indolence, and through the innate disposition of the human mind to rest satisfied with that the results of which are the most easily perceived; a position by no means the result of careful consideration, but arising from the negations of modern teaching, from the prevailing tone of medical literature, and from the self gratulation which can be felt at finding something definite and certain, some fractions of the truth that we can state in precise terms and figures, and which we may use, or fancy to be a substitute for the whole truth, which as yet lies far beyond.

Closely associated with this prevailing characteristic of the professional mind, is another which has to do with the method employed; and this stated in the most general terms, consists in our ignoring the questions "Why?" and "How?" and simply asking the question "What?" This we are doing to an almost exclusive, and, as I believe, injurious degree in physiology, pathology, and therapeutics. Not that we deliberately set our minds to erase from their surface and dig up from their depths, the tendency to inquire after causes; but that practically we inquire much less into causes than we did, and rest satisfied with statements, which may be more accurate to the degree they extend than those formerly acquired, but which stop far short of explanation.

Thus, in physiology we no longer trouble ourselves with divers questions as to why certain classes of animals are found in certain quarters of the globe, and others elsewhere; why there are the differences that exist between the several orders of the animal and vegetable creation; how it comes to pass that the marsupium is provided for the imperfectly developed embryo; how the herbivorous stomach is associated with grinding teeth; why hybrids are sterile, and how the limits of hybridity are fixed; why the life of man is ordered in relation to time, so that at certain epochs dentition, puberty and decline occur; and how at these periods there are special proclivities to disease. Instead of thus perplexing ourselves we discover and record the actual facts; we make maps displaying the geographical distribution of the species of animals and plants; we describe with increased minuteness the orders already known; we take percentages of human life, and construct tables of mortality; we establish insurance offices to provide against the contingencies we are unable to avert; we tabulate, and can tell one another to the minutest fraction of a grain, the mean amount of urea it is our bounden duty to excrete; we know how long is our marketable expectancy of life; and given the weight, age, sex, constitution, disease, and length of its duration in a certain individual, we might tell him with some approximation to accuracy how soon his *rigor mortis* ought to set in, and how soon it would disappear!

The tendency is, with definite statements of this kind, to rest contented, and to carry physiology hitherto, and no further; to treat as moonstruck and valueless, except as another example for some asylum statistics, the individual who is not quite satisfied with such results, and who endeavours to gain some glimpses of the truth, which they approach and partly represent, and the rest of which he is striving, although but dimly, to see.

In pathology we carry the system still further; we now value little anything that does not come to us in algebraic form, and we do not read anything that goes beyond. Pathological books will soon be a series of very "compound-addition" sums. We are only pleased with such statements as these: that out of a hundred cases of such a disease, the hundred being imaginary, or perhaps eighty of them, for twenty only of them have been actually examined, 49·36 presented headache, and of these 9·42 suffered frontally, and 8·33 occipitally, and that the rest were doubtful; that an hereditary taint was discovered in 50 per cent.; that the mean duration was 13·72 weeks; that treatment effected nothing in 99·99 per cent.; and that, *post mortem*, such a lesion was found in so many cases, and such another in the rest.

When this method is employed only as a means towards an end, and such a definite result is obtained as a perception of the truth, that there are two great groups of fevers hitherto confounded into one; and when that knowledge is carried still further, and when we are shown that these are not different forms of the same disease, but that each is dependent upon a specific poison, then the method referred to is of the highest value. When the hereditary character of phthisis is examined, and the laws of hæmoptysis are traced, as they have been by Dr. Walshe,[1] most valuable additions to our knowledge are made ; but when some half-dozen cases are examined, and percentages of great accuracy are calculated from them, and carried to two places of decimals ; or when the information conveyed consists only in the detail of a number of vulgar fractions, then the work is useless, and worse.

By statistical information we may show that many currently-received dogmata are wrong ; and in regard of pathology, that our nomenclature is fearfully defective. We may point out the direction in which the truth lies, and may approximate an accurate statement of certain facts ; by percentages we may eliminate errors, and convey some fractions of the truth ; but the truth itself, the principle, or law, cannot be converted into figures ; it lies beyond them, is an inference from them, and is subject to no exceptions and no change.

That typhus and typhoid fevers are two distinct diseases, and originate in two distinct agencies, is the most logical conclusion warranted from the facts laboriously brought together by our President ; but the distinction between them is as marked in two individuals lying side by side in the same ward as it is in two hundred individuals scattered throughout the metropolis. No collection of figures can represent the two truths elicited ; they are independent of number, and exist in the facts themselves, as appreciated by the mind. That which is typhus, and that which is typhoid, must in each instance operate according to fixed laws, and produce appropriate and uniform results under identical circumstances ; but the conditions of operation are most complicated, and we cannot yet unravel the mysteries of organisation or of meteorological constitution. What has been done, then, is the aggregation of facts, their analysis, comparison, and contrast, and an inference has been drawn ; but the numerical statements which are made represent only fractions of the truth with regard to the distinctness of those two diseases; and that we are obliged to use them is evidence of the necessary imperfection of our modes of observation, the limitation of our powers, and our incapacity to seize upon, and regard as phenomena, naked and abstract truths.

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[1] Dr. W. Hayle Walshe was Professor of Medicine in University College from 1848 to 1862. A most eloquent memoir of his late master will be found in *The Lancet* of December 31, 1892, from Sir J. Russell Reynold's pen.

Certain phenomena are essential to the idea of, or rather are necessarily included in, that which we denote or connote by the terms typhus and typhoid fever respectively; these are present in every case. Others are not necessary to the idea, and they are observed with less or greater accuracy. The principle of association of essential features into two large groups has been seized by Dr. Jenner,[1] but that of non-essential characters has not yet been discovered.

The point, then, that I wish to insist on is, that the mere collection of facts is useful, but only as a means towards an end; that the numerical analysis of facts is useful only in the same manner; and that the true value of statistics is in their pointing to something beyond them, which requires neither fractions nor percentages for its expression, viz., the truth, which is always dimly or partially seen; but even in those portions which we do see is ever harmonious and unchanging, and as true and unchanging in the individual as in the multitude, in the minutest atom as in the universe itself.

Now, let it be borne in mind that a necessary part of the mental process which led to the demonstration of two classes of fever, and of two distinct sources of disturbance, is the question "why?" Here are a hundred cases of "continued fever" in many respects bearing close resemblance; but some present these features (rose rash, intestinal disturbance, &c.), others present a different series (mulberry rash, and so on); an accumulation of facts, ever so carefully carried to two places of decimals, would be valuable, but would not advance pathology; but the question "why" these different groupings occur? is asked, and immediately an "advance" is made, for the answer comes, because the two groups have different causes, and can, further, be traced to different sources.

There is no conviction more strongly impressed upon my mind than this, that the constant tendency of the human mind to ask the question "why?" and the insatiable desire to receive its answer is the great stimulus to work, and the most potent agent in advancing science of every kind. Absolute "final causes," or "first causes," we may never find out; they may be utterly beyond our present reach of thought and our present capacities of apprehension; but the search after reason and cause—the endeavour to travel as far forwards as is possible in the path towards their discovery is the most fruitful endeavour of the human mind; fruitful in the discovery of truth, and also, it must be allowed, in the supposition of error. The tendency of the present day is to ignore causation, and give up the question "why?" and this because some in endeavouring to supply an answer have given falsehood instead of truth. The tendency is wrong, and its adoption is merely adding cumbrously to the breadth of science without promoting its advance. It is one feature of the professional mind, against which, therefore, we have earnestly to strive.

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[1] Sir William Jenner's researches were made public in 1849.

The mode in which the prevailing philosophy of medicine affects therapeutics is evidenced in the "expectant" medicine, or medical fatalism of the present day. Doubtless in years gone by a great deal too much was done, and done erroneously; but now there seems growing up, and this especially amongst the younger members of the profession, an idea that medicine can do nothing, or at all events nothing but harm. We seem to be in danger of forgetting that thirty grains of ipecacuanha in a tumbler of warm water can exert an effect; that five grains of calomel and an ounce of castor oil may exercise some influence; and that opium, quinine, and iron are of certain utility, and produce appreciable results.

"Cases get well without treatment," it is said. "A placebo is all that is wanted—syrupi rhœados semi-drachma; aquæ fontanæ fluid-uncia; sextâ quâque horâ is amply sufficient," and so on. There is some truth in all this, but all this is not truth. Dr. Garrod's recent researches on the combination of solanaceous alkaloids with caustic alkalis is somewhat humiliating evidence of the want of accuracy in making therapeutical observations. It is surprising to think that so many must have continued prescribing these two things together without ever discovering that no results followed the introduction of the alkaloids: but there the fact stands a melancholy illustration of therapeutical carelessness.

The action of medicines is not submitted to rigid examination, and so long as this continues undone, therapeutics cannot advance. That which is true in the medical fatalism of the present day is, I think, the gradually growing disbelief in specifics, *i.e.*, in the power of a given drug to expel a given disease. The idea of specifics had its origin in some metaphysical notion of disease as an entity in the organism, which entity was to be cast out by another entity, somewhat stronger, coming in; and this notion is dying out of the professional mind. We now regard disease as a condition of the organism, which has to be changed; and whilst the number of even so-called specifics is daily decreasing, and increased knowledge of the early conditions of disease is displaying the fact that by judicious measures, medicinal and others, those conditions may be changed or their results obviated. Bad health is not regarded as an entity to be removed, but a state to be improved by physical education. Disease is not a demon to be exorcised, but a bad habit to be reformed.

In order to improve the state of professional education which is not in some respects that of advance, we want serious changes of the following kind. Instead of wasting two or three years in compounding pills and draughts, and occasionally seeing practice which he cannot understand, the student, before he enters upon his curriculum of college or hospital work should be well grounded in physics, chemistry, and botany, and not be bothered (as he often is during this period even) with the "bones." He should bestow comparatively much less of his time upon anatomy, and much more upon physiology. Psychology in its non-controversial points should form an integral part of his education. Lecturers on medicine and surgery should not waste their time on pathological anatomy; but leave that to its proper teacher, and thus gain more time for instruction in symptoms and vital characteristics of disease. The spirit of investigation should be evoked rather than details crammed down, and the action of medicines should be made a special object of clinical study.

By such means we should gain the advantages derivable from the prevalent philosophical system of the day, and should at the same time avoid its injurious results. Practical medicine would then advance, instead of becoming, as it now appears in danger of becoming, a cumbrous mass of unwieldy, diagnostic, and prognostic machinery, with the daily increasing conviction that, therapeutically considered, it is of little use.

A vast responsibility attaches to us in the performance of our duty ; life and death, happiness or sorrow, are committed to our care. Some of us are not too old to recollect our feelings when the first patient entrusted entirely to our care died in spite of all our efforts. We may remember the suggestions of our own minds that this thing was left undone, and that the other might have been better left undone. We may remember writing the death certificate with a trembling hand, doubtful both of our diagnosis and our treatment. But some of us are not too young to know how lightly we regard these matters now ; and although this may in part be due to enlarged experience and acquaintance with the limits of human power to arrest or avert the progress of disease, let us see well to it that this ease does not come from a false system of practical philosophy, from a pride or self-sufficiency that would assign the limits of scientific art just precisely where our own information reaches, and from an unworthy throwing of personal responsibility on to the broad shoulders of science or irresponsible laws.

In relation to popular opinion and respect, the medical profession undergoes great vicissitudes of fortune ; but in spite of all its reverses, it manages to live on, and to appear as well fed, and in as decent apparel, year after year, as if really fortune had nothing whatever to do with its comfort and respectability.

There are always different parties in the community, and by one or another some form of the medical practitioner is kept alive. Sometimes one party is predominant, sometimes another, and yet no one of them utterly dies out.

In regard of popular feeling just now, the community may be divided into three classes. First, there are those forming the utterly respectable supporters of "the Ministry," and who believe in the orthodox practitioners; who have faith in the Royal Colleges of Physicians and Surgeons, and in the worshipful Society of Apothecaries; who call things by old names, believe in fever, inflammation, boils, gout, consumption, and other maladies; respect fervently leeches, blisters, black draughts, blue pill, and colocynth; send for their doctors as soon as they are ill, do just exactly as they are bid, inquire simply whether the liver is affected, or the head, and are satisfied with what they term his "pronouncings." They think they are attacked by a veritable enemy; they respect most highly some one who "knows their constitution," and who knew their father's, and who knows also what their "enemy" is; they believe in "bile" and "bilious attacks;" and giving themselves up to the man who brought them into the world, or sent their fathers out, they are bothered with no doubts, and are content to be killed or cured in the approved and orthodox old way.

Then there is another class, the sceptics and eclectics; people who believe that medicine is all a sham, and who never send for advice until they are frightened, because very bad. They do it then with a bad grace, and with a half-suppressed supposition that it will do no good. Sometimes they follow the advice that is given; but more often they do just the opposite. They get more frightened, multiply opinions, call in Drs. This and That, believing in neither of them, and perhaps dying in that faith; or getting better, and saying that it was because they took some of their own port wine. They treat the science as a farce altogether, speaking of it as uncertain and useless, and yet are so constantly wandering from one to another of its practitioners that they get no good at all; and while philosophically asserting that the art can do nothing, and that Nature must do everything by her own inflexible laws and irresistible operations, they yet growl at the practitioner for not accomplishing more than their own statements allow to be possible.

This class is a large one, but not so large as the third, which consists of the extremely credulous, these latter being frequently a compound of scepticism and credulity. The great desire of the third class is something new, something they can talk largely about and do a little bit of themselves; and there is always plenty of novelty for their amusement or their injury. These people are eccentric, and often pride themselves in "free thinking" and in knowing a little—I beg their pardon—a great deal of physiology and pathology. They have generally got hold of some "wonderful man," who knows everything; and they regard the orthodox practitioners as bigoted old women, who know far less than themselves. They always have plenty of cases in their memory, and they think themselves fully qualified to observe and interpret the phenomena of disease and of medicinal action. They have second hands to their watches, and feel their own and one another's pulses, and they have a great fancy for looking at their own tongues in the glass. They are learned upon diet, and know exactly what alcoholic stimulus does, and they are very kind in offering suggestions to their medical advisers. They always use scientific terms, and flatter themselves they do this very correctly. One of this class never tells you he has "taken cold," or that he is "bilious," but you are informed at once that your patient has bronchitis, or suffers from gastric irritation; and you are asked whether you have heard of Dr. So-and-so's new remedy, or have tried Mr. Nobody's mode of treatment.

These patients know what symptoms to have, and generally have them, and if you do not cure them immediately they go to some one else, who cured their first cousin of a similar attack; they know it was precisely similar, and what was done in his case was so-and-so. They always ask what you are going to give them, because generally they cannot bear the slightest grain of some half-dozen most ordinary drugs. They are always taking medicine, and recommending others to do the same. They travel to Germany to drink the waters there; go to Harrogate, and rejoice in the odour of antiquated eggs. They try globules for a time, and carry about them most tempting little cases of bottles, from which they regale themselves with grain doses of differently named samples of sugar of milk, and all this in accordance with their little books. Hydropathy, compressed air baths, quack medicines, revalenta arabica, galvanism, mesmerism, spirit rapping, and the like are all tried, and one and another for the time extolled; then they go their backsliding ways to "antibilious pills;" have a fit of claret; then an attack of "old dry Lisbon;" become teetotalers, vegetarians, great walkers, and carry pedometers, wear ventilating hats, try brandy and salt, and give up coffee, find out "its all the stomach" and take pepsine; break their legs, and go to a "bone-setter" to have them mended. They wish they had been doctors themselves; they think their own cases the most extraordinary upon earth; they believe to the full in physic of all kinds, but they as potently believe that no one understands it but themselves; and when they are about to die, they always think it is because they did not do something else, or "drink some waters" for a month longer three years ago.

Now, it is owing to the numerical and social predominance of one or the other of these three classes that the regular orthodox profession has its position of affluence, respect, or ignoring; but the distribution of these classes, and the influences they exert are in great measure due to the bearing of the profession itself.

With regard to medicines and systems of medical practice, there are similar cyclical changes to those which we may recognise in religion, politics, and art. The diversity of the human mind produces parties, which without running into minute analysis, are these three. (1) The old orthodox believers in institutions, and the ways of their grandfathers; (2) the believers in themselves, in the next generation, in novelty, or at all events disbelievers in the old; and (3) a certain middle class of sceptics, eclectics, and the like, often very foolish in their conduct, although priding themselves upon superior judgment.

So soon as there is an infallibility assumed, a papacy of science, letters, medicine, surgery, or what not, there is a protestant association on the side of reform. Let the protestant become dogmatic, or even orderly and positive, and there is immediately dissent. Let dissent in its turn become authoritative, and then there are others who "from this orthodox kind of dissent have dissented," and although there are some willing to stop at every halting place of opinion, there are others willing to stop at none, but endeavour after some Utopian scheme which cannot be realised, and which mainly consists in a negation of the value of any other.

At the present time the reform, advance, or dissenting party in medicine is a large one. The orthodox believers are also numerous, and the eclectic class, partly sceptical, and partly credulous, is intermediate in numbers and influence. The regular profession, *i.e.*, ourselves, we who are the favoured people of truth, are renounced by the first class, half renounced by the third, and only cordially believed in by the second; whilst that large party, compounded of the credulous and would-be advance devotees cling fondly to those heathen and gentile intruders, the homœopaths, hydropaths, mesmerists, bone-setters, and the like.

Why is it that the regular profession has only a limited number of faithful adherents? Why is it that so large a number of the people are dissatisfied, and are constantly veering off into paths, whose absurdity seems only equalled by their hold upon the public mind? Why is it that so many, whose real object is truth and progress, and well-being, should be found opposed to the orthodox practitioners? What is it that has lessened the respect of some members of the community for the profession?

There are several proximate causes which may readily be pointed out, although it may not be so easy to suggest means for their removal.

The first of these is that some of the older practitioners, of all ranks in the profession, are scientifically considered far behind the present day. They ignore or treat disdainfully that which they did not learn when themselves at school. Their practice is enormously large; they are hurried from house to house; they trust to their all-seeing eyes, and their "very large experience;" they give little attention to the cases that they meet; they deal in platitudes; fire off prescriptions at a moment's notice; take their fees, or cross off names in their visiting books, and are gone, producing a marvellous impression of sagacity and experience on the faithful few, but on many of the thinking and feeling portion of the community, leaving no other impression than that they are most delusive institutions. This does not, of course, in any way, apply to many of the oldest or most time-honoured names; but it certainly applies to some, and to their scientific ignorance and practical carelessness much of the common disrespect of the profession is due.

We should not judge them too harshly; many who think the most harshly would probably do the same if placed in a similar position; and there are abundant excuses for their negligence. Their time is fully occupied; they are jaded with each day's work; they are constantly beset with long stories about cases they can see through at a glance; they are often called in just to back up another practitioner against his client's doubts; many do think that skill in diagnosis is in proportion to the rapidity with which it is framed; and that knowledge of disease is evidenced only by positive and off-hand assertions. Their time is valuable; their words are weighty; they know not how to limit their work, and yet do justice to themselves; they cannot do justice to all their patients without limiting their work; they are on the horns of a dilemma, and who shall solve it?

We would not attempt the solution; further, we would not take one farthing from the annual receipts of those, the value of whose counsel and experience is beyond all pecuniary representation; but it may be suggested that their rate of remuneration should be increased, so that they should do less work but do it better, have more time for reflection, and have it within their power to keep *au courant* with the science of the day.

Another fruitful source of the disrespect paid to the profession is the present state of medical literature, and for this the younger members of the profession are mainly responsible. We have some works of which any country might be proud, but these are as the few grains of wheat among cartloads of chaff, the poor halfpenny-worth of bread to balance an "intolerable deal of sack." Baits, in the form of books, are thrown in to catch idle *roués* at their clubs. Taking titles are devised for nervous dowagers and dyspeptic lords; books are made easy reading in order to beguile the railway traveller; some numbers of some of our journals have more the character of "advertising vans," than of scientific periodicals. Extraordinary cases of the cure of some incurable diseases are announced. You read them, and find first that the diagnosis was wrong, and then that the patient was not cured; but the title of the paper is in the columns of *The Times.* Carefully analyse the titles of books which may appear in half-a-dozen papers, and though differing in form they scarcely differ in spirit from the puffs of 50,000 cures to be effected by this or the other pill or unguent. One would think from a perusal of our title-pages that every fact in medicine was known, every disease understood, every ill amenable to treatment; that we were omniscient sages and consummate artists; but alas, too frequently the largeness of our profession is only equalled by the vanity of our performance!

There is one consolation with regard to this species of literature, and it is that it cannot live. It serves a merely temporary purpose, and has only a temporary existence; but while it lasts it must, and it does, lessen the respect which ought to be felt for a learned and scientific profession.

It is easy enough to see the source whence it rises. There is a great law of demand and supply, and the more philosophical or scientific treatises are not read. Numbers of books therefore are written, not for the purpose of conveying important information, not as the vehicles of discovered truth, not as the results of earnest and successful work, but as mere indirect advertisements that this physician or surgeon has attended to, or wishes it to be understood that he has attended to such a colony of diseases, and that the other has devoted himself to a different class.

The young physician or surgeon looks about for a vacant nook in the field of maladies, he luckily hits upon one that has not recently been broken up, and immediately the literary plough is put in, the seed cast, and the forthcoming crop announced. The profession as a whole is to blame for this, because in the main it is intent upon remunerative practice, rather than advance in science; and because it regards that which is readily perceived, and can be turned immediately to practical account in treatment with more favour than anything which really contributes to the stock of knowledge, but which may not be so easily applied.

In addition to these two causes (the requirement of trifling books by the careless readers, and the consequent mere advertising bookmaking to supply the demand), there is still a deeper source of this miserable literature, and one which affects every rank of the profession, some primarily and some secondarily. I allude to the absence in this country of any tangible reward for purely scientific merit and scientific work of the higest order. There is no position which the profession or the Government of the country can give to a medical man as the reward of his labours which it is worth his while to accept, if by practice he can make £2,000 a year. There are not half-a-dozen positions that are worth his acceptance, if by practice he can made £1,000. There is, therefore, no external inducement to real exertion; for the posts, such as do exist, are frequently obtained by other influences than those of real merit.

In great measure this arises from the multiplicity of our schools, and consequent deterioration in value of the posts which they can offer. If our metropolitan schools were diminished to one-fifth of their present number, there might be offices worthy of the ambition and stimulative of the exertion of the most energetic and the best informed; there would be some encouragement to continued scientific labour, and to really earnest devotion to those branches of professional study which cannot be directly remunerated by fees. But as it is, there is no stimulus of this kind, and the work that is done is of low order, and the literature that results is of inferior character and temporary existence; for what is the young physician or surgeon to do? If he has real ability, perseverance and high endeavour, he may devote himself to work, and in due time gain his reward; but the process is a tedious one, and there are many who have neither the qualities which shall secure true distinction, nor the capacity for patient waiting while they work. What then is one of this class to do?

What he often does is of the following kind. He takes a house, and duly announces himself by brass plate, and, it may be, "night bell"; he ventures upon an occasional brougham; and decorates a boy in buttons, or a man in sober black; he has waiting-room and consulting-room in perfect order; he is furnished with stethoscope, urinometer, microscope, and litmus, or with catheters, bistouries, and bandages; *The Times* is supplied for the waiting patients; he is ready to devote himself to every case that comes; but he sits in solitary state, and reads *The Times* himself. A dispensary or hospital appointment falls vacant, and forthwith there is a vigorous canvass; every electioneering device is employed; his committee drinks his wine; his testimonials fly to the four winds; weeks are spent in unpleasant callings, and sometimes in still more unpleasant and unworthy tricks. He may get his appointment or he may not; but we suppose he does, and then, he has a large field for charitable exertion; and in this he may work, as some have done most nobly. But he might find this also a field for useful observation, and might by careful elimination elicit from it valuable results. Yet it often happens that he merely spends hour after hour, month after month, in ordering plaisters for lumbago, ipecacuanha for colds, or in strapping up old abraded legs, and seriously considering whitlows and gonorrhœa. A complimentary fee or two comes from some kindly disposed governor of the charitable institution; but our young friend works on gratuitously, and reads *The Times.*

And now comes the book with the pretension of large, but the evidence of ill-digested experience; and he is soon honoured with a scantling of "gratuitous patients," kindly sent to him by valuable friends—old servants of the family, perhaps, out of place, who happen to have the disease he has written of in his book. He sees them, because it may lead to something else. They come with long drawn elevations of the knocker, as if the door's vocal apparatus uttered a heart-rending sigh, and suddenly cut it off in the middle; for the timorous object of charity, while pondering on his woes, is seized with the idea that he but keeps the young doctor's eye in for tongues, and his ears for auscultation.

Then follow the small people, who think they will "have a physician for once," and go to a young doctor and get a full guinea's worth for their fee. They think the favour they confer is great, and they depart fervently impressed with their own importance.

The book, if properly adapted to the times, begins to tell; and soon gentlemen hurry up from the City in hansom cabs, detail their grievances in five minutes, and are gone. They meet one another in the waiting-room, and now the doctor's fame begins to spread; for man is a gregarious animal, and nothing is so consoling to Mr. Dyspeptic's feelings as to know that some other unfortunate is in the same boat with him; and he would rather be killed in good company than cured alone. M.P.'s, stray Baronets, and Reverend gentlemen appear in due succession with apparently one prevailing impression upon their minds, viz., that their titles are to be taken in part payment of their fees, and accordingly they generally suppress the baser coin. A few consultations break the ice still further, and soon the young, or now the middle-aged, physician or surgeon is fairly launched; is towed in one direction and toadied in another; he finds himself of great importance, and his time is no longer his own. He has gained his practice through an easy or through a tedious path, and he is not now disposed to attempt any serious work.

But there is one other cause which influences the respect in which the profession is held, and which is, I think, operating now to its serious disadvantage ; it is the occasional deficiency of medical information, arising partly from the multiplicity of schools, partly from the system adopted at those schools, and partly from the mental character and calibre of many who are induced to enter the profession simply as a mode of "getting a living," but who have never inquired for themselves, and whose friends have never inquired for them, whether they had any real liking or aptitude for the work.

Whatever may be its causes, or the combination of its causes, it is allowed that there is ignorance and want of adaptation for the kind of study or employment, and this in practitioners of every grade, and at all ages ; and such a circumstance cannot fail to lessen the dignity of a profession, to which is entrusted the health, happiness, and the life of the community.

With, then, these defects in the education, literature, scientific character, and deportment of the regular profession we cannot wonder that, with society constituted as it is, there should be seen on the one hand triumphant quackery, and on the other philosophic doubt.

The orthodox practitioner is beset on either side ; and while some have too much bigotry for the novelty-hunter, and too little certitude to impress the credulous, they have not the scientific character, and too much self-confidence, or confidence in old dogmata, to gain the respect of the thinking eclectic. They are, therefore, limited to those, who, from old habits, or conservative principles, or personal regard, are happy in entrusting themselves to the representatives of the recognised institutions of their country, whether the issue is life or death.

But, notwithstanding these conditions, which are certainly not those of advance, there is much with regard to which we may honestly congratulate ourselves and one another. The position assigned to the science of life, and the method adopted in teaching that science, secure for us many advantages previously beyond our reach. Information is more definite, more accurate, and more valuable ; and if, practically, we profess ourselves able to do less good than was formerly believed within the scope of therapeutics, most undoubtedly we do less harm. If we cannot cure the developed diseases which an enlarged pathology has separated, and enabled us to recognise, we may detect them in their earlier stages, may accomplish more by hygienic measures in their prevention, and be more fully prepared for their final issue. We know more accurately the limits of our powers, and if occasionally giving less hope than our predecessors, we are not the sources of such bitter disappointment. We can influence disease in the masses by attending to the conditions from which it springs, and we can safely construct insurance offices which shall be of advantage to the many without injuring the individual.

These are no inconsiderable powers ; but in using them we should not use them exclusively, but endeavour to advance the science and the art in all directions in which it may be carried forward by human ingenuity and toil. And if with regard to the position of the profession in popular respect there is that which we have to lament, and the more so because it is in great measure dependent upon certain conduct of the profession to which exception must be taken, there is still much in which we may gratefully and hopefully rejoice. There is certainly no other profession which enjoys more of the public confidence and esteem, and which, in a vast number of instances, so thoroughly deserves them both.

There may be carelessness here and ignorance there ; but scattered throughout our country there are thousands of men who are, with diligence and self-sacrifice, performing their arduous duty. There are many great names of which England and Europe may be justly proud ; and there are others of whom Society makes constant mention, and with profound and well-earned respect. But, besides these, there are thousands who are little known beyond the circle of their immediate occupation, but who are the real friends of the suffering and sorrowing poor ; whom no inclemency of weather, no loneliness of country side, no squalor and wretchedness, no fever-haunted den of misery and disease ; whom no combination of all that makes life heart-sickening and almost abhorrent to our nature, can deter or frighten from their work; but who perform that work with no other reward than the dying blessing of some poor labourer, whose day of toil is done, the thanks and tears of the fatherless and the widow, and the consciousness of having faithfully finished the work which was given them to do. These are the men who leave no trace behind them on the page of scientific history, who may have contributed no fraction to the sum of human knowledge, but whose life is not forgotten; and who, when the muster roll of humanity is complete, will be found to have done that which is more really good in having strengthened a manly charity and Christian love, which are abiding things, than in having added to the partial and imperfect knowledge which shall vanish away.

While, then, cherishing the memory of those great ones that have gone, honestly priding ourselves upon the great ones that are yet living amongst us, and paying our tribute of thanks to them for the measure in which they have contributed to the advance of our profession, we would not forget nor undervalue the labours of others, who, with less apparent effect, but with no less certain results, and often with a higher aim, have so lived and laboured as to win for the whole body, of which they formed a part, the respect and gratitude of our race.

The real advance of practical medicine is not determined solely by the position it takes among the sciences, or by the success which attends its therapeutic efforts, but by the elevation of its moral and social character, and to this real advance all may, in their proper sphere, contribute. There is scarce any imaginable limit to the influence for good which our profession may exert. To it are entrusted all the capacities for suffering or for pleasure with which our mysterious organisms are endowed; life, with all its manifold changes, its bodily infirmities, its subtleties of mind, is committed to its care. The realisation of long-deferred hopes, the blighting of fairest prospects; the weakness of the once strong man; the almost fiendish strength of the bodily-enfeebled maniac; the victory over agonising pain; the humiliation of loathsome malady; the joy of returning health; the crushing grief of irresistible disease; birth, with its labour and sorrow; and death, with its repose, are among its familiar scenes. We are daily and hourly placed on the threshold of life, on the border-land between the seen and the unseen. We have constantly before us the great unravelled problem of humanity. Vague sounds float out to us from those around whom disease has thrown the mysterious veil of so-called unconsciousness. We hear them wandering in the darkness our human knowledge strives to penetrate in vain; we feel that it may be light. What questions are we not asked by those who stand around, eager to know what relation those objects of solicitude, and of long years of love, yet bear to them? There lies the vesture of mortality, scarcely rustling with the breath of life. Can it again be placed on common terms with us? Are there any ties yet left unsevered? Or is it, even now, the cast-off garment, fitted only for decay? We stand appalled before the great facts we can neither doubt nor explain. We are conscious of our two-fold being. We can recognise its intense reality in the consciousness of others. We are regarded as the interpreters of that awful hour; but how to interpret all these circumstances is not taught us in pathological treatises; how to act under them finds no place in our systematic therapeutics. We have to learn it by the study of ourselves and others, and by the experience which time alone can give.

But "thanks to the human heart, by which we live," thanks to its nobler nature, its common sympathies, "its tenderness, its hopes, and fears," the suffering man has always found in the medical profession the succour and support he needs: and if, year after year, the scientific advances which are accomplished are not such as to satisfy the ambitious inquirer after truth, yet the sorrows of humanity are hourly soothed, and the load of life is lessened by the unselfish care and kindly offices of that profession, whose mission—to use the words of one of its great masters, but recently passed away—is to "cure the curable and comfort the incurable;" and in whose ranks it is our common honour and privilege to take our stand.

THE FACTS AND LAWS OF LIFE:

Being an Introductory Lecture delivered at the Opening of the Medical School of the Westminster Hospital on October 3rd, 1859.

GENTLEMEN,

When William Tell had resolved to aim his arrow at the apple on young Tell's head, neither the malignant taunt of his oppressor, the timid entreaties of his friends, nor the innocent confidence of his boy, could deter him from his purpose, or diminish his chances of success. Gessler may smile grimly as young Walter takes his stand beneath the distant tree, still as a statue, but without one touch of fear—the crowd of friends may be breathless with horror at the thought of failure — but yet Tell lifts his trusty yew, and draws its well-tried string. But there is a lengthened pause; and although the skill and daring of the man are household words among the young huntsmen of the Alps, Tell lets his cross-bow fall;—and why? Strong passions have dimmed his sight; he cannot see the mark at which he aims. No matter how vigorous may be his arm, nor how firm his resolve; no matter how skilled he may be in his art, how pure in his motives, how earnest in his effort; no matter how strong may be the confidence with which long years of success have inspired his soul; no matter how much may hang upon the issue of his attempt, he cannot, he knows that he cannot, succeed. He might display daring, energy, skill, but yet he would miss the mark.

In the drama of *Wilhelm Tell* great historic events have been preserved, with such marvellous fidelity, beneath the poetry with which the genius of Schiller has adorned them, that the strong limbs of the world's real history give all its form and movement to the poetic dress his art has so thrown around them as to hide only the ugly or unimportant, and reveal only the beautiful and true. The same genius may be seen, perhaps less conspicuously, but not less really, in the minute incident, or "aside" allusion, I have quoted. In it we may so recognise the faithfulness with which the artist could observe and render Nature, as to see, that in her finer features there are signs of the oneness that gives authority to all her teaching, and renders her lessons applicable to all conditions and all times.

That which is true of the Alpine huntsman's cross-bow, is also true of every kind of endeavour that man may make. If he would be successful in his work, he must keep the object at which he is aiming both well and constantly in sight. But it often happens that his sight is so dimmed that he cannot see his mark; and then, no matter from what source the dimness comes, should he persist in his effort, the results would be disastrous. The fault of sight is not to be conquered by energetic exertion; for, indeed, the very energy with which an effort may be made is, not unfrequently, the cause of failure.

Such fault is not peculiar to one profession; it is common to our race. Man, whatever his work may be, does often lose sight of his true and acknowledged aim. The admitted aim of the counsel's presence at a trial is the just application of evidence and law to the particular case under consideration; but it has occurred, in practice, for the barrister to forget his mark, and his aim has sometimes appeared to be the establishing of what is false, and the perpetration of a wrong, the more keen because inflicted under the garb of justice. Political leaders, whose true aim is the welfare of their country, have been thought, sometimes, guilty of such dimness of sight that, to the ignorant lookers-on, their most energetic efforts appear directed rather to secure the welfare of their party. Conservatism is the avowed aim of some; yet so strong has endeavour been on its behalf, that one, at least, has exhibited the *reductio ad absurdum* of his principle and has avowed his object to be the maintenance of that which is, no matter whether it be a state of stagnation or of progress. On the other hand, we have seen the reformer so eager in his work, so radical in his resolution to turn all things upside down and inside out, that he has brought again into being and pre-eminence the very abuses that his forefathers had renounced and removed.

If, then, the barrister, in his most earnest pleading, may be so wide of the mark that he regards simply his client's welfare, or still worse, his own reputation for fine speaking; if the political leader may be so benighted as to think that the interests of his party are identical with those of the community; if the conservative may do the reformer's work, and the latter accomplish a retrogression in the affairs of State, we must not feel surprise if the medical student—whose true aim is so to learn the facts and laws of life as to utilise his knowledge, in every way and to the highest degree, for his fellow-men—we must not at any rate blame him too severely, if, in his eagerness to attain this end, it should sometimes appear that he is but learning the names, and the most easily acquired means of so distinguishing the most ordinary diseases as to pass an examination, and make use of his diploma for himself.

But, although things are not what they ought to be, neither are they what they seem; and these are but the extremes—the one the highest, the other the lowest—between which the student of medicine practically takes his aim. It is scarcely possible that he should, perfectly and exclusively, realise either the one or the other. There is no man, no matter how lofty may be his aim, nor how earnest his endeavour, whose whole career is free from all taint of either selfishness, prejudice, or shortcoming; neither is there, I trust, any student of medicine—no matter how poor may be his conception of the work he has taken upon himself to do, nor how lazily he may be inclined to do as little as is possible to "pass" just safely, rather than to practise ably—there is, I believe, no one, even thus unworthy of the rank he now holds, who is not sometimes moved to sympathy with the sufferings of his fellow-men, sometimes eager to know more than mere passwords of the great mysteries of Nature by which he is surrounded, and into which he is urged to look; and sometimes desirous of hereafter throwing his mite into the treasury of scientific knowledge, and lightening, by his aid, the heavy burden of humanity.

But, if the aim and work of the student may graduate between such extremes, and if in all individuals there is some battling of the higher with the lower tendency, our object should ever be so to cultivate the one and repress the other, that the student of medicine may become the true man of science, of art, and charity; and that he may become this, he must constantly keep his aim in sight; it must be that which gives unity and form to all his actions, his purposes, and thoughts.

The huntsman's arrow is not, however, always on the wing; nor is he always with strained eye, keeping the mark in sight; there are moments when he burnishes the shaft, or mends the broken string; times when he plays with his weapon or lays it aside in rest. And so with another life-work: it is not that, at every moment, the eye, and heart, and hand must be fixed on one end, and working in one groove. Such tread-mill like occupation might grind corn, and be more wholesome than utter idleness; but the man would be thus using only a fraction of his energies, and would himself make no advance. It is not that the constancy of your purpose is to be the fetter to confine your limbs, nor the dead weight to drag their movements down to a dull uniformity; but it is to be the harmonising power—that which gives resultant direction to, and ensures progress in, the thousand-fold differently-pointing and acting forces of your being. There are, however, special occasions upon which a man's occupation may, with advantage, be the reconsideration of his aim; the removal from it, and from himself, of obstructing and confusing elements; and the gathering together of his powers for renewed and more successful exertion. No occasion presents greater claims to be thus employed by you than does the first day of a new period of your work, when you resume old studies and enter upon new ; take stock of your intellectual property, and ascertain the balance of memory and forgetfulness ; arrange your plans of work and of recreation, and start again forward in your life-career.

The aim of the student of medicine is, as I have already said, so to learn the facts and laws of life, in both health and disease, as to utilise his knowledge in every way, and to the highest degree, for his fellow-men.

The *subject-matter* of your study, then, is LIFE.

There are many things and many principles which it is almost impossible satisfactorily to define ; but yet upon these very subjects we know so much, that nothing is easier than to criticise and pull to pieces the attempts at definition made by others. I remember to have seen a number of gentlemen—barristers, physicians, clergymen, and others—formerly the pupils of a college in the metropolis, who were assembled to discuss the principle lately adopted by the University of London, of admitting candidates to the examination for degrees in Arts independently of their having attended any lectures at a college. These gentlemen, congregated for the very purpose of arguing in favour of a college education, were absolutely silent when asked by the distinguished historian of Greece to define what a college was. We may know very much without being able to define, for a true definition is much more than a mere means of recognition, with which it is not unfrequently confounded. We may recognise an individual by his walk, or by his hat ; but neither a military gait nor a peculiar head-dress would be a definition of our friend. Again, with man, he may be the only animal that cooks his food ; but the definition of man that he is "a cooking animal" is eminently unsatisfactory. It is comparatively easy to discover means for distinguishing one object from some other, or from some other hundreds of objects ; but a definition must be the statement of that which invariably distinguishes it from all others. In order truly and comprehensively to define, knowledge is required co-extensive with the facts, and accurately correspondent with them ; and there is little—nay, there is nothing—with regard to which our information is thus perfect; for, at the best, we know but in part, and see all things, "as in a glass, darkly," as unsolved problems for our study or our faith. This partial character of our knowledge is eminently true in regard to life. Much as we know about it, there is yet so much more that we do not know, so much that we feel not only may be, but is, and yet is behind some veil our sight cannot penetrate; near to us, and yet so placed that we cannot grasp it with our hand; so like ourselves in another that we feel that we are one, and yet so far separated by the dense wall that comes between soul and soul that we know that each is individual and alone; so much that points to some principle where consciousness and experience may be one, and yet so much that rises up between us and that principle, that hitherto it has escaped our most earnest gaze: there is so much that is mysterious in life, so much that is attractive in its mystery, that other sciences have been made but stepping-stones to a knowledge of this, the highest science; and yet with all these aids, and with our two-fold method of arriving at its truths, viz., consciousness and observation, there are none which have so persistently and entirely eluded our grasp. Still the attempt is carried on, and life is the subject-matter of your study; and your endeavour must be to know accurately that which can be known about it, and to know it all.

The view which we take of life will influence deeply the method of our study and our action. If definitions are defective, still they indicate tendencies, or directions, along which investigation has proceeded; and our adoption of one or the other will affect, if not determine, the direction of our own effort. It is not my purpose to examine definitions now; I will merely enumerate four classes of definition, for the purpose of showing that all they have yet accomplished is to give hints of the directions in which investigation should proceed. Whether we define life in some such abstract terms as the "tendency to individuation," a definition which confessedly includes stocks and stones as well as trees and men; or, in such chemico-mechanical phraseology, as "a double interior movement of composition and decomposition," an expression which, if adopted, renders it difficult to see wherein life differs from a galvanic battery or a common fire; whether we regard it as a "divine aura," and thus place it at once beyond the reach of all physical investigation; or as a particular expression of some general physical force, thus making it to agree, in essence, with heat, light, and electricity; whether we choose the one or the other of these phrases, by which it has been sought to define the nature of life, we shall fail in finding it to be a satisfactory definition, and we shall gain little real help from any one of them, unless we recognise that no one of them is in itself fully comprehensive; but, on the other hand, we shall lose much unless we see that there is in each some truth about life which it would not be well for us to pass by. Each expression I have quoted, although it points out some striking feature of life, yet leaves undefined that which it seeks or pretends to define; and we are left with these phrases, these hints of direction, reared as finger-posts, at long distance from each other, and each pointing from the light or twilight in which it stands to some spot in the darkness, at which their converging lines may meet. We may take our start from either of them, and advance freely to a certain distance, for the light is still around us, and our path beaten by the steps of those who have gone before; but soon the darkness comes, our path wanders and is lost, and we must retrace our steps, or stumble on into the still deeper night. Yet we know, we feel certain, that there is some point wherein all these lines must meet; we feel confident that they do not pass onwards and onwards into the infinite, without relation to each other, without meaning and without end; but that there is a central truth towards which they lead; and hidden though it has hitherto been, and still may be, from human eye, yet it is a reality which gives meaning to all that tends towards it, to all that lies around it and above; and that its discovery is the goal towards which all successful investigation of life must be directed.

Life, then, as the subject-matter of your study, embraces much more than it sometimes appears to do in your physiological hand-books; in it is wrapped up, besides bones, muscles, and intestines, the being and destiny of humanity. It is to be studied in the silent and solitary depths of your own consciousness, as well as in the lecture-theatre and dissecting-room; you must see it in the minds and hearts of your patients, as well as in their limbs and viscera; you have to deal not merely with that which may be analysed, experimented upon, cauterised, bandaged, or cut off and cast away; you have to do not only with those pains which may rack the body or disturb the mind; you have for your study not only the material fabric, which is so mysterious in its facts and processes; but you have also for your study its still more mysterious tenant; you have to do with that which can rise superior to all weakness, and can triumph over all pain; and which in the very article of death may utter the prophecy of a life, as yet unseen, but still felt to be, and to be more real, more strong, than that life which, though so real, is now sinking into silence and decay—a life whose witness here, having just burned into your soul's deepest creed the facts that it is, and that it cannot die, is itself, in another moment, carried beyond your sight.

If, then, you would so learn of life as to alleviate its woes, you must not regard your patients as merely interesting clinical phenomena; you must not look on them as cleverly-acting physiological machines, upon which you may experiment for your own diversion; you must not imagine that "cases" are brought before you for the purpose of illustrating books, or of proving so-called statistical laws; that diseases are existing for the sake of teaching you the long names which men have given them, or for the sake of establishing this or the other pathological opinion; that limbs have been created and broken that you may feel the crepitus of fractured bones; or blighted, that the surgeon may display his skill in their amputation;—you must take far other views than these, and see that, in each sufferer who may come before you, there is an individual history, as interesting as, perhaps more so than, your own; you must see that disease is something far more important, and far deeper than an aching head, a hurried breathing, or a fluttering pulse; that disease is something much more serious than the mere interference with the mechanism of physical life; that the measure of its evil is, not the increased rapidity of pulse, not the daily wasting of the body nor its numerical frequency in the bills of mortality, but the degree to which it so tells upon the mind, heart, will, and power of man that it prevents him from doing that work in this world which it has been given him to do. Whatever pathological creed you may adopt as to the essence of disease, be assured that this is the true measure of its magnitude, the true standard of its evil. He who after having toiled arduously and successfully for years, yet when having completed his threescore years and ten, amidst much weakness, distress, and pain, can still carry on the work that he was accomplishing, and, while on his death-bed direct others in their work, and aid them by dictating his own latest thoughts, is far less diseased, though his malady may invade whole organs, and may be of the most so-called malignant order — yet for all the highest ends of life he is less diseased than is the wretched and useless hypochondriac, who, with strong limbs and mighty appetite, is, and has been for thirty or forty years, a mere drag upon society and friends, a torment to himself, a useless, actless, complaining cipher, always fearing the evil, which at last comes, it may be, by accident. Yet in the latter case the most acute pathologist, with micrology and chemistry to help him, can find no trace of malady in any one of his long-maligned, but, even at the last, most creditable organs.

The mysterious material body which is your care, must be regarded as but a subservient part of a more mysterious whole, and you must never forget the higher elements in your eagerness to understand the lower.

While the subject-matter of your study is vast, complicated, and attractive, it is such that you cannot know it in its essence. Nevertheless, you may learn its *facts* and *laws*, for these come within the range of our powers. We have to learn about life, just that which we have to learn about heat, light, electricity, or gravitation. The nature or being of any one of these we do not know; but, by reason of their less degree of complication, we have become acquainted with a larger number of their facts and laws. The same kind, however, if not the same degree of knowledge, is possible in regard of life.

The word FACT is used in two senses. It is employed to designate an actual occurrence, a something done. Fact, in such sense is equivalent to that which is, or was. But it is used, as commonly, to denote a statement of what was, or is, according to the testimony of an observer. Fact, therefore, means correctly that which is; incorrectly that which is said or believed to be. In the former sense, we speak of the "facts of Nature;" in the latter, of the "facts of Science." The process of respiration is at this moment going on in each of us; certain movements are effected in our bodies; certain changes, textural and chemical, are wrought in our tissues: the air of the room is affected in composition, temperature, and weight:—these are the facts, the actual occurrences, of respiration; they exist independently of all physiological treatises; they are unchanged by our having written anything about them, right or wrong; they are the subject-matter for investigation and thought. But the process of respiration is described in books, and has been described from the time of Hippocrates to our own; the muscles and nerves that effect the movements of the chest walls have been enumerated; the precise changes in blood and air have been detailed, and that with extreme minuteness; theories have been introduced, and respiration has come to mean a certain more or less definite chemico-vital change; but, apart from theory, and apart from all secondary meanings of the word, we say of our physiological treatises that "the facts of respiration are to be found" in them.

Now, the moment that the word "fact" is applied to a description, or to any statement of what occurs, this supposition is made, that the individual who observed the occurrence was not only capable of observing correctly, and of detailing accurately, but moreover that he did so. In other words, that a correspondence existed between his mental conception and the reality; and further, that he has represented as truth that which did really exist as fact.

Without pretending to decide whether this correspondence ever has been, or ever can be, absolutely correct; without affirming that the facts of science must always be only approximative in the accuracy with which they describe the facts of nature, this, I think, may be stated, without fear of maligning either our capacities or our scientific systems—viz. that, at present, the correspondence is by no means perfect; and that, therefore, the facts of science should be constantly submitted to re-examination, and to comparison with the facts of nature, that their true value may be assigned them.

In order to learn the facts of life, you have to observe them for yourself, and you have to become acquainted with those which others have described; and that you may do this successfully, great caution and circumspection are required. "What!" you may ask, "am I not quite competent to take notice of any phenomenon, and just describe faithfully what I see? Surely, this is the simplest thing that can be required of me; common sense and honesty are the only faculties required for such a purpose!" True! common sense and honesty are faculties that you require; but how rarely can even these be found, and these alone! We bring to our observation not only our abilities but our weakness; not only the truths we have learned, but the errors we have received as truths; not only consummated information on some points, but very partial and imperfect information upon others; not only honest intentions but preconceived opinions; not only an earnest wish to know the truth, but as earnest a wish that the truth should turn out to be something we have fancied it; not only a humble desire to learn what nature teaches, but a vain and very foolish desire to find our own pet theories, or the favoured theories of others, confirmed by her great authority.

But further, for the observation of certain facts a special kind of education and much anterior knowledge are required, and with this very education and its results there are attendant sources of fallacy. If the means to be employed in an investigation are imperfect, the result will share that imperfection. If the object you are inspecting is distorted by the glass you employ, so long as you are ignorant of the distorting power of your glass, your idea will be out of correspondence with the fact. If either chemistry or physics be defective, when you describe a vital function in terms of chemistry or physics your description will be, *pro tanto*, depreciated by that defect. You have to guard against all these errors ; and simple, therefore, as it may at first sight appear to be, to observe a fact, let me assure you that there is no faculty in which the scientific man exhibits his right to that title more distinctly than in this very power of observation ; and that there is no faculty the absence of which from many minds has brought more confusion and more error into our scientific annals.

The facts of nature are unchanged ; and surely the mind of man was as able and as honest in the days of Aristotle as it is in our own ; but many of the scientific facts of his time are not those of the nineteenth century—nay, the scientific facts of to-day are not those of the past year. We have thrown aside as errors the statements which our fathers, or even we ourselves, had regarded but a few months ago as facts proved by the latest science.

Scientific facts are not, then, very easily observed ; and why they are not you will see, if you think for a moment what a scientific fact really is. It is the description of a certain kind of phenomenon, or process, in terms of two or more other kinds. It is the division of a scientific word into its syllable or letters. For example, the scientific facts of life, *i.e.*, of the kind called " vital," are described in terms of other kinds, such as chemistry, mechanics, physics, chronology and the like. The facts of the vital process termed respiration are thus resolved into certain chemical changes in the air and blood ; certain mechanical arrangements of chest-walls, muscles, and nerves ; particular relations in regard of time, of expiration and inspiration ; certain changes in the colour of the blood ; the temperature and hygrometric conditions of both the body and the medium in which it is placed. The facts of respiration undergo, therefore, in the attempt to state them, a process of reduction to their lowest terms; and these latter are not vital in their character, but physical, chemical, and mechanical. What is vital, is the link of connexion or association of these facts *i.e.*, not the letters themselves, but the words they spell.

One half of the facts of life cannot be submitted to this process of reduction; they can be stated in no simpler terms, and in no terms which are otherwise than figurative. You may compare one kind of sensation to another kind; you may qualify it by comparison with external conditions or processes; and thus you may speak of a "silvery tone," or of a "tearing pain;"—but these qualifying terms are figurative, and the words, tone, pain, taste, light, feeling, and odour defy all analysis, and are insusceptible of reduction. The same is true of all the processes of mind and heart: you cannot express these in chemical or mechanical phraseology; they must have a language of their own. It is not, however, with regard to these facts that I was speaking, but of those which are to be witnessed in the material body, and which it is the effort of science to reduce.

The reduction is constantly advancing; but, at the same time, the sciences of physics and chemistry progress, and any change in them necessitates some change in the statement of the facts of life. Until all the sciences are perfected, both in quality and quantity, there must be some want of correspondence between the facts of nature and those of every science; and in proportion to the advance of the simpler sciences, the more complex must undergo changes in the statement of their facts.

These are the necessary obstacles in the way of your appreciating facts; but there are some very unnecessary hindrances —which you may at once perceive and avoid—such as careless observation, and prejudiced reporting; and there are others, to escape from which will require all your care. The capacity of humanity for creating difficulties, and then blundering among them, seems almost infinite; see to it, therefore, that you do not take *fancies* for facts.

There have been, and still are, in science, mere fictions of the mind, having no counterpart in nature; perfectly gratuitous assumptions, or groundless assertions of things which the Magi of a past, or of the present generation, may have invented, in accordance with their preconceived notions of what nature ought to be and to do. We need not go back to past centuries for the discovery of such fictions; the "archeus" of Van Helmont was not less real than "the vital knot" of M. Flourens; and in our own day, and in our common conversation, there are terms used, and that very freely, of which it is by no means easy to show the counterparts in fact. I would not say that such words as "hysteria" and "rheumatism" have no meaning, for it is well known that there are certain definite conditions associated with those names; but let me ask whether the adjectives "rheumatic" and "hysteric" are not daily used without any approximation to a meaning, and without the shadow of belief that the aches or pains so denominated bear any relation to that which is denoted by the words rheumatism and hysteria respectively? Not content with the limits of pathology, as an arena for confusion, some men have gone, with such words as their passports, into the region of religious feeling and social history; and the present so-called "revival" in Ireland has been deliberately denominated "hysteric," and that in scientific quarters! As well might the builder's strike—because the sweat of the labourer is stopped, and his temper somewhat soured by the process—be termed "rheumatic!" These words are, nine times out of ten, but figures of speech; the clothing of ignorance or laziness in verbal finery or would-be scientific grandeur; and this even where the substantive use of the words is something more than a mere refuge for destitute diagnoses.

Do not mistake legitimate *hypotheses* for facts; but understand, and always bear in mind, that they are hypotheses, and as such they may be of great utility. The hypothesis is useful, inasmuch as it is often a hidden thread, binding together otherwise disjointed facts into provisional groups, so that the mutual relations of these facts may be studied, and also that the group as a whole may be compared with other groups. The hypothesis, moreover, suggests an explanation; or, at all events, the direction in which an explanation may be sought. It supplies temporarily some fact, some link in a chain of phenomena, or some relation between them, which is at present unobserved. But unless your hypothesis is of such a nature that it is susceptible of future verification, or the reverse, by direct observation and experiment, its continued employment is illegitimate, and it is useless, and further, it is worse than useless when its nature (as an hypothesis) is forgotten, and it is taken for and employed as fact.

Many systems of classification which have been of great service, contain in them much that is purely hypothetical, and which eventually yields to an improved scheme of grouping. Thus, in the Linnean vegetable system there are numerous guesses at truth, underlying very superficial phenomena, which latter were used as lines of classification; and in the more "natural" systems of De Candolle and Jussieu, there is still some hypothesis in the construction of every "alliance," and indeed of every order and genus. The hypothesis is, that there exists between the individual species of a genus some nearer and deeper relation than any which is apparent in petal, leaf, or fruit; for in one species this character is absent, in a second that character is wanting, and no one contains all, and yet not more than all, the features proper to the group. Each species ranges itself round an imaginary centre —a typical, but non-existent combination of qualities—supposed to represent and witness to other characters than those which meet the eye; and the hypothesis is, that in the essence of each individual member of that genus, there is a greater likeness or oneness than there is between members of one genus and those of another. We know not what the essence is, but all our attempts at classification, in so far as they are successful, and that because true to nature, are approximations towards its discovery, *i.e.*, towards a knowledge of the facts of its history.

There is no difference of kind between the principles upon which we base our classification of those natural objects with regard to which systematic arrangement has arrived at its highest perfection—as, for example, in botany and chemistry —and those principles by which we classify other natural objects, in respect of which our information is far less perfect, as in physiology and pathology. Our classification of disease therefore contains much legitimate hypothesis. Of this let me give you an example. In the "Letters" of Morgagni, there are to be found cases—minutely and graphically described—in which we can now readily distinguish the features of a well-known disease. For many years such cases had been and continued to be observed; but it was the merit of the late Dr. Bright to form them into a group, and to suggest the link of connection between their diverse symptoms.

But if you ask, "What is Bright's Disease?" I reply, that it is the expression of an hypothesis. Let me remind you that there may be three individuals suffering symptoms of this disease, and yet, at certain periods of their history no one shall present any symptom precisely identical with those of either of the others. In one there is anasarca; in another hydrothorax, or ascites; in a third there is no dropsical effusion: in one there is albuminuria; in the others it is absent: in one the head is principally distressed, headache and blindness are present; in a second, the chest, there is dyspnœa and cough; in the third, the abdomen, there is vomiting and diarrhœa: in one the kidney is enlarged; in another it is atrophied; in a third it is cystiform. There is little in either their general appearance, their age, the onset of their malady, its subsequent history, or in their mode of death, in which either two of these three cases resemble each other; and yet each may be an unquestioned example of "Bright's Disease." What then, is "Bright's Disease?" Every feature it presents in one case is absent in another; you cannot define it by this, or the other symptom; you cannot limit it to any one condition of the kidney. No; the name expresses a hypothesis—viz., that there is something common in all these cases; that there is between them a closer and deeper affinity than that of their merely presenting in common, should they do so, albuminuria, anasarca, or the like; that in their essence—*i.e.*, in the essential character of the departure of each from healthy vital action—there is a similarity or oneness which we cannot yet define; may perhaps, never accurately and comprehensively describe, but which, nevertheless *is;* only, like life itself, it will not be compressed into our formulæ nor expressed in our words. The various cases range themselves around some non-existent case, the centre and type, from which all exhibit more or less marked divergence. That which constitutes the centre was supposed to be a particular condition of the kidney: the hypothesis was that therein lay the fundamental fact, associating the various forms of Bright's Disease. Prolonged investigation, however, appears to show that this idea is incorrect. But, in whatever direction future research may prove the true essence of Bright's Disease to exist—whether it be found in some hitherto undiscovered condition of the kidney, in the blood, in the nervous system, or in that which is denominated "nutrition"—the construction of a group of cases, by means of this hypothetical consideration, has been of the greatest utility.

Hypotheses of the kind I have just sought to explain underlie every attempt at scientific classification, for there is no perfectly natural system save that which pertains in nature itself—viz., the division into species. All grouping beyond this is artificial, and but an approximation towards the truth: each grade is a step upwards towards some generalisation, or some law of life; but there are no steps, any more than there are leaps, in nature itself: the slope, in reality, is a continuous incline; the steps are but aids, artificial lines and halting-places, which we have cut out to assist us in our progress.

In one department of your study—viz., that of Medical Jurisprudence—you will have to recognise the existence of artificial lines, even more arbitrary than those which have been introduced into scientific classification. As students of nature with a scientific purpose, you fail to find points through which lines of perfectly true demarcation can be drawn, and you begin to believe that such lines do not, and cannot, truthfully exist. But, for social and legal purposes, such means of distinction must be employed; and, if natural lines cannot be found, artificial ones must be created. Scientifically considered, a man may be insane, or guilty of this or that special crime; but, legally regarded, because he is on one or the other side of a line, which it has been convenient to draw, and which is, or was, well drawn at some period of our history, he is to be treated socially as sane, or innocent of the alleged transgression. You must distinguish, therefore, between legal tests and scientific hypotheses; although the former may be based upon the latter.

But the legitimate use of hypothesis must not be confounded with its illegitimate abuse. Care is required in the formation of this implement for study—care that it is not contradicted by facts, and that it is of such nature as to be susceptible of verification; for without such caution the hypothesis is a hindrance rather than an aid. The words "pre-tubercular stage of phthisis" may not only have some meaning, but may express a chronological fact, as well as, upon certain premises, a logical necessity; but the existence of such a stage as a clinical fact is yet unproven; and the introduction of such phrase into symptomatology is, I think, precipitate and undesirable—not because it is a hypothesis, but because its verification is, from the very nature of the supposition, impossible. Again, the words "suppressed gout" may, in years that are past, have had relatively some more definite meaning than they can have now, inasmuch as our forefathers did not know what they meant by the very gout that was suppressed; but in the present day we have heard, and may still hear, trains of symptoms that have lasted for a lifetime set down most ruthlessly, and without the shadow of evidence, to this mysterious thing—"suppressed gout!" Do I mean to say that gout cannot be suppressed? By no means; such assertion would be as absurd as to say there are no "mute, inglorious Miltons" in our country churchyards. The one statement would be unwarranted by history, and in the teeth of all the poetry of agricultural life; the other would be unwarranted by pathology, and in direct opposition to the authority of most venerable practitioners. But what I do assert is this, that any one who uses such term should be liable to some pains or penalties if he does so as a guess; that he should be compelled at once to verify his hypothesis, or to devour his own words; and, that if, in these days of pathological chemistry, such verification is impossible, the term should be cast away from our nosology as an illegitimate hypothesis.

Modern pathology presents a profusion of these illegitimate hypotheses, and they are obstacles in the way of its advance. Sometimes they are created for the purpose of concealing ignorance, and sometimes for the purpose of securing fictitious and temporary fame. Showy as they are unsubstantial, they often appear fashioned, as the so-called "balloons" of the circus may be, to be held up for the purpose of destruction—glittering, gilt-edged baubles, through which critics, horsed on their editorial "we," may leap unhurt, to the admiration and astonishment of those who know not which to admire the more, the flimsy speculation, or the equestrian's agility in its demolition; but, which to all who are earnest in the search for truth, and who see that it is not to be found by an everlasting iteration of this circle of creation and destruction, is a lamentable waste of time, energy, and skill, and a still more grievous fallacy, because often mistaken for real progress.

Again, mere matters of *opinion* are not to be confounded with scientific facts. Such confusion often occurs from either carelessness or ignorance. The individual committing such mistake does not substitute a fiction of his own imagination, a deliberate creation of his own fancy, for a fact; neither does he produce anything which is worthy of the name of hypothesis. His guess is neither ingenious nor philosophic; it may be right, or it may be wrong; but if either, it is so by chance, for it is a hastily or ignorantly formed opinion passed off for fact.

It has been said that "one fact well observed is worth a cartload of opinions;" but opinions, whether single or in cartloads, are of some value, and that in proportion to the information and ability of those who frame and utter them. The opinion of an individual, either absolutely ignorant of auscultation, or totally deaf of both ears, would be of but little value in most cases of heart-disease; but minor degrees of these incapacities appear at times to confer upon the dicta of some people an extraordinary amount of importance.

But, whether particular opinions are of great or of little moment it is of the utmost consequence that they should be distinctly separated from scientific facts. For example, it is the opinion in some quarters that an intimate connection subsists between disease of the supra-renal capsules and bronzing of the skin; it is the opinion in other quarters, that the relation is an accidental one. The facts are, that the two elements are often associated, often not; and it has yet to be shown that when they co-exist there is not some other element essential to their relation. It is the opinion of some that bronzing of the skin and emaciation of the body depend upon disintegration of certain nervous ganglia in the neighbourhood of the supra-renal capsules, and that it is only when disease of the latter extends to these nervous elements that the cutaneous and nutritive effects are observed; and hence, that the supra-renal capsules have nothing to do with either the chromatogenous function of the skin or the nutrition of the body. These are opinions, and while the unquestioned facts are still *sub judice* in regard of their explanation, what is to be avoided is the expression and use of these opinions as facts.

It is because this kind of distinction has not been maintained that so much evil has arisen in many of those judicial investigations, where not only medical facts but scientific opinions form part of the evidence. Whether the case to be investigated be one of suspected lunacy or poisoning, we almost invariably have the spectacle of scientific witnesses called up in violent hostility to each other; and the report of this warfare is followed by an outcry from the public and the press, that, as the doctors disagree so widely, their evidence is of little value. This, gentlemen, is an opinion; it is not the fact; but there are some grounds for its existence in the public mind. A jury has to form its conclusion from two classes of scientific evidence, viz., facts and opinions; it has to hear a description of what actually occurred—of what are the symptoms, for example, of natural disease, and of what are the symptoms of poisoning. In order to decide upon such evidence, the jury is supposed to be educated up to a sufficient scientific eminence to form a rather difficult diagnosis, and to settle a question with regard to which the most careful and the best-informed of our profession might feel doubtful! But the evidence does not stop at this point; scientific witnesses are asked their opinions upon, or interpretations of, the facts they have stated. These opinions are given; and generally between those of the witnesses on different sides, and sometimes between those upon the same side, there is as great a divergence as is possible within the bounds of common sense; nay, sometimes even these limits are overleaped! The difficulty of the juryman's task is now increased tenfold: before, he had to judge of scientific facts, now he has to judge of scientific men; he has to weigh in the balances, not only their statements, but their opinions —not only their veracity, but their ability; and he has to form his own conclusion—and one which must be at variance with a large amount of scientific evidence and opinion from one side or the other—by a judgment amongst scientific men, by the differences in their mode of stating facts, and by a discrimination among the facts based upon the scientific credibility of the men.

Now, I readily believe that some plain-thinking, common-sensed artisan is quite competent to perform the task of at once recognising that some opinions given in evidence have no value whatever; that the man who has framed them has done so in carelessness or ignorance, or both; and that they are self-contradictory, or at variance with facts which he himself admits. On the other hand, the high value of some opinions may be immediately perceived and correctly estimated. But, when neither of these extremes is present, or when they are so combined or opposed as to neutralise each other, the position of the juryman is one of intense difficulty and complication. This it is by the very nature of the case; but its difficulty is increased to a most unnecessary degree by a want of distinct separation between the two kinds of scientific evidence, viz., the facts and opinions. This distinction is frequently neglected in all parts of the trial; scientific witnesses, counsel on both sides, and the judge himself are alike guilty.

To exclude either element of evidence is, I think impossible; to banish the facts would be to deprive the jury of all standard for the valuation of opinion; to exclude the opinions would be to take away all hints towards an interpretation of the facts; while on the other hand, to allow both elements of evidence is to give opportunity for a curious and somewhat unsatisfactory mental process, viz., the balance which an inexpert juryman has to strike between his own scientific opinion and that of the highest scientific authority in the country; and it furnishes, moreover, the opportunity for almost endless blundering between these two things, which are essentially distinct, viz., facts and opinions.

Again, do not treat and use as facts mere *half-facts*, or other fractional parts of them. Many statements may be true, but imperfect; and they become not only useless, but injurious when their relation to the whole truth is disregarded.

There are two different ways in which you may know but half the facts of a question; you may be acquainted with the evidence on one side, and be entirely ignorant of that upon the other, or you may know only half of the evidence on both sides. He who, as a matter of habit, knows only the one side of a question, must have his mind diseased or crippled by prejudice; and if he act upon such information, his action will be that of the bigot. On the other hand, he who habitually rests satisfied with half knowledge, on both, or all sides of a question, must, to begin with, care little for the point at issue; and if he have any interest therein, it is of some secondary or trifling moment.

If the medical student rests contented with the teaching of one book, or of one school, and cares not to know the views contained in or entertained by another, he exhibits a prejudice which may seriously injure him in after life; but, if he is contented with acquiring only such a smattering of information on all sides as to have no opinion of his own, and no valuable knowledge on any one disputed question, it will very probably be found that he cares little for truth for its own sake; and further, that his scraps of information bear a striking relation to the pet views of reputedly crusty examiners, and that his magnanimous aim in their collection is to "get through the Hall."

Avoiding the sources of fallacy which have been enumerated, keeping steadily in mind the broad distinction between facts and fictions or fancies—those scientific "delusions" which demonstrate the scientific insanity of a man;—further, maintaining hypothesis in its proper place, and perceiving the difference between that which is legitimate and that which is not; distinguishing between opinions and facts, and between parts of the truth and the whole, you may learn much of the facts of life; and having learned these well, you advance by their aid, as by the alphabet of a new language, to the study of VITAL LAWS.

The term *law* is one with which we are very familiar, but its applications are most various. It has been used to denote those ten great utterances of man's moral and social responsibility, which have come down to us, with sublime mystery and authority, from a far distant antiquity; and the same word "law" has dignified the last percentage announced by the Statistical Society. Those bare generalisations of geometrical facts, revealed by the motion of the planets about the sun, and of the satellites around their primaries, have been termed, from the period of their institution to our own day, "Kepler's laws;" while, on the other hand, the proscriptions and restrictions of the last Act of Parliament form the latest addition to the "laws of our country." The general statement of a progression in the order of development, from the general to the special, forms one of the "embryologic laws of Von Bär." The positive philosopher states, that the three stages through which scientific study passes are "laws of the progress of humanity;" his critic may state that they are, or are not "laws of the human mind." And again, the conditions upon which individuals are admitted into this excellent institution, are termed the "laws of the Westminster Hospital."

Disregarding mere differences of detail in the objects to the phenomena or relations of which the word may be applied, it is very commonly said that there is one great distinction to be observed between the several uses of the term which I have just enumerated, and that by means of this distinction we may form two categories of laws. In the one, it is said, is prominently conveyed the idea of enactment in accordance with the will of an individual or institution, plus a coercive power employed by that will, in order to enforce obedience or to inflict pains and penalties upon its transgressor. In such general idea, the Decalogue, Acts of Parliament, and the laws of this hospital agree. In the other category there is no bringing forward of this idea; all that the law contains is, it is affirmed, a statement of the conditions under which certain phenomena occur. Apparently, there has been some endeavour to get rid of the idea of will or coercion from the statement of such laws; and in such negation are practically allied to one another, the laws of Kepler, those of the Statistical Society, of Von Bär, and Auguste Comte.

This distinction is not one in regard merely of the supposed origin of the laws referred to; the ideas of will and coercion are essential to the very conception of law in the one class, and not only inessential, but, in the judgment of many, absolutely foreign to the idea of law in the other class. This difference, however, is, in my belief, apparent, but not real; on the contrary, that which is common to all the uses of the word, and which justifies the employment of the term "law" to any of them, is, in my judgment, the presence of those very ideas which it seems now to be the wish of some to exclude Whensoever the word law is used, there is in it the suggestion or conception of that which is other than the phenomena, and greater than the mere fact of the order in which they occur. There is inherent in the idea of law the suggestion of a plan; and it is only to such generalisations of sequence as contain this suggestion that the word is correctly applied.

What, then, is the difference—for one plainly exists—between the two groups of laws that I have quoted? It is this: that, in the one group there is merely a command—by a visible or admitted lawgiver—which may be disobeyed, the penalties resulting from transgression being the fulfilment of the law; in the other, there is no expressed command; the lawgiver, though unseen, being necessarily assumed—but there is no place for disobedience. To the one kind of law man's will may be opposed; he can obey, or he can resist: to the other kind the will of man may be opposed or not, but he has no power of resistance; obedience is a matter of choice in the one case—in the other, no choice is allowed. Thus, a man may violate every moral principle—he may break every social tie—he may transgress his country's laws, but he cannot escape from or resist the law of gravitation: he will sink in the water if he makes no effort to escape; he cannot resist the vital law of respiration; he must breathe air, or die. Moral and social enactments may be so inextricably interwoven with laws, of which they form but a part, that their violation involves, and that of necessity, ulterior evil; but physical laws cannot be violated; man cannot choose between obedience and penalty. The association of suffering with sin is, in my belief, as real as that between air-breathing and human life; but the relation, in the former case, is matter of inference from other data than mere experience; in the latter, it is matter of actual observation. If, then, not only the idea, but the fact of coercion, is more evident in the one group of laws than in the other, it is in that very group from which the modern philosopher would exclude it. So familiar has man become with the transgression of moral and social law—with the determination to run the risk of penalty rather than simply to obey—that, because he sees physical laws maintained inviolate, he loses sight of their common nature, begins to think of them differently, and tries to denote them by different words. And surely, if the difference that is supposed to exist does pertain between them, some difference of terminology is needed.

An ingenious and learned writer has proposed, in order to rid our minds of the "intrusive and delusive meanings" with which the word law is "clogged," that it should be omitted altogether from our scientific glossary; and he substitutes in its place—though, it must be allowed, with some misgiving—the term "method," or "path." The so-called laws of nature are, in his improved phraseology, "the *paths* along which the activities of nature travel to results (phenomena)."

But, let me ask, what is the meaning of a path? Surely there is, in the idea of a *path*, something besides, other than, and anterior to, the "activities" which travel along that path! If it mean anything, it must mean a distinct and necessary line or direction, along which this travelling must be accomplished; a something, outside of which the "activities of nature" cannot "travel to results!" In such idea, that of coercion is as distinctly present as it is in the term law. The philosopher of to-day has taken the strait-waistcoat from off nature, but he has not set her free—he has placed her in a padded room! Surely such treatment is not a true example of a system of non-restraint! The hunter, in his loose-box, has more liberty than when tethered to his stall, but he is not free. Restraint is still present in the philosophy, the asylum, or the stables of the nineteenth century; although it may be in a more pleasant form, than in the words, the cords, or stalls of a bygone day.

It may be said that the supposition of will or coercion in the conception of law is an attempt to explain how the laws were framed, and whence they came, not what they are; and, that in making such supposition, we at once pass beyond the limits of scientific inquiry, and enter the domain of either theology or metaphysics. If an attempt to explain what is meant by, and included in, the terms of vital function, secretion, respiration, and the like, is a departure from natural science, or from the science of physiology, and is an entrance into the region of etymology, chemistry, or mechanics, then the endeavour to say what is meant by the term "vital law," is a departure from the science of physiology; but it is so only in a similar manner, and to an equal degree. You cannot advance one step in the science of life unless you know the meaning of the terms you employ, *i.e.*, unless you are already acquainted, on the one hand, with so much of chemistry, physics, and syntax as to enable you to comprehend and to refer to something more general than the vital functions you are studying, the elements and processes before you ; neither can you advance towards the appreciation of a scientific law, unless, on the other hand, you have some notion of the meaning of that term, and unless your idea of law is of more general extent than that of the particular example you are studying.

We must, then, endeavour to know what we mean by "law," and, if we would grasp that meaning, we must seek to discover it by other means than mere verbal translations of the term and its idea. If by "law" it is said, is intended a generalisation of the conditions under which certain phenomena occur, let me ask what is meant by "conditions?" Do we, by such phraseology, get rid of the ideas of coercion or of will? By no means ; these are still present, only under another name. The word implies something more than the facts and their relation—something greater than, because the source of, their order of occurrence. Mere sequence is expressed by the words "do" or "did;" *law*, by the terms "shall" or "must."

For these reasons, then, I would insist upon it that—no matter with what eagerness some may endeavour to find in natural law nothing but a generalisation of the conditions under which phenomena occur—there is invariably and inevitably some supposition besides and beyond the facts, which supposition does, in reality, give meaning to their words and thoughts. If there is no immediate recognition of God, there is some mystical conception of Nature, or some personification of Order ; and to the will, or action of one or the other of these the law is referred. It is not that, by law, we have merely expressed what is, or the mode in which what is appears to us, but the method in which God, Nature, or Order operates. Remove, as completely as you can, all metaphysical entities from the idea of law, and there is yet underlying it such a supposition of order and uniformity, of independence and unchangingness, which are attributes of a something that directs, pervades, and embraces all, that the most so-called "positive" philosopher, in his very endeavours to escape, only binds himself hand and foot more closely by the ideas of coercion and of will.

Inasmuch as in the possibility to appreciate facts there is the proof that a relation subsists between our minds and external nature, so in the capacity to advance to the idea of law there is witness to a still deeper harmony. "The laws of nature (as it has been well said) are at the same time laws of reason; . . . the geometry and mechanics which are practically applied in the works of nature, are precisely the same as those which reason perceives as necessary truth; so that in scientific observation we are really viewing the laws of our own reason operating around us in the objective world." But the laws of our own reason, and the laws of nature, in thus testifying to their common origin, bear witness to that which is greater than nature and higher than man; and whatever may be the application of the word, there is, I believe, always, as part of the idea of law, the conception of a source far higher than itself—the suggestion of a purpose and a plan, of which the facts and laws are but the fragments of a revelation.

This is true of every form of "law." Those ten great utterances of man's moral and social responsibility, by their nature-like simplicity, depth, extent, and universal application, proclaim their source to be that from which nature itself arose: those great commandments, the conception of which, as kept inviolate, is that of a perfected humanity; those expressions of what man should be, so lofty, and so far above his actual life, and yet so consonant with all the ideas, so far as he can frame them, of what his life was meant to be, are such that he cannot regard them as laws of his own making, but as having their source in that which is far higher than himself, their origin in Him, who is not only the Creator of the material world around him, and of his own material body, but the Author of his intellectual power, and of that which is the highest element in his being, viz., his own moral nature. The laws of a country or an institution have authority and stability, because they are in conformity with responsibilities and laws profounder than those of the country or institution from which they issue and to which they are applied. The laws of nature, whether seen in the tiny cell of some microscopic monad, in the mimic whirlpool that a rotifer may set up in a drop of water itself almost invisible to the naked eye; or seen in the perturbation of some planet's satellites, so distant from our world that thought is baffled with the attempt to imagine its extent, so vast that the mind trembles and sinks under the effort to conceive its grandeur—wherever these laws are traced, there is, in them, the witness to that which is beneath, above, and around them all; witness to that which is still deeper than our most microscopic search, still vaster than our most extended gaze; to that which transcends all our knowledge, but which is yet the light of all our seeing.

> "Whose dwelling is the light of setting suns,
> And the round ocean, and the living air,
> And the blue sky, and in the mind of man:
> A motion and a spirit that impels
> All thinking things, all objects of all thought,
> And rolls through all things."

And as we trace the harmony between our own thoughts and the facts of the objective world, we are moved, as the soul of Kepler was when he saw the planets obeying the order which his reason had marked out for them, to exclaim, "O God, I think Thy thoughts after Thee!" In thus viewing law as the expression of the Divine thought, the mode in which God has been pleased to act, we arrive at its truest and deepest meaning and find it is not only the key to unlock nature's profoundest mysteries but the keynote to which our efforts must be attuned if we would understand her mighty harmony, and take our part therein.

In order to arrive at the discovery of law, there are certain fallacies to be avoided. Do not mistake for law mere sequence of events, although apparently invariable; do not confound therewith either accidental coincidence, mere speculation, or numerical hints of the direction in which law may lie.

There is no need that much more should be said on the confusion of mere *sequence* with law. Illustrations of a *post hoc, ergo propter hoc* mode of reasoning are too common to require further remark than that the real test of such fallacy is the discovery of a third element, previously unconsidered. Because when the sun arrives due south the chimes of a neighbouring tower perform a certain tune, and a large bell tolls twelve times, there is not to be inferred any necessary connection between that position of the sun and the particular tune that falls upon the ear. Certain clockmakers and bellmakers have come in between the sun and the sounds; and they could if they chose, so arrange their apparatus that the particular sounds in question should occur at some other time, and that when the sun arrives due south the clock should strike one, or a quarter past. If, instead of coming to such unexpected grief, "Big Ben" and his satellites should have still kept true for centuries to come, until the well-known "traveller from New Zealand" commenced his sketch from a "broken arch of London Bridge," such long tried and invariable association would not demonstrate the existence of a law to the effect that a certain position of the sun was necessarily associated with a certain chiming of those bells. Yet such laws as these, and many based upon evidence not one hundredth part as good, are current in the science and pseudo-science of the day. We frequently leave out of the account our clockmakers and bellmakers, our men who wind up and regulate the works; and we fancy that the fore-established artifices, such as division into certain and particular hours, are parts of nature's plan. Absolutely invariable sequence is the strongest evidence you can obtain of the existence of some law; but a mere expression of that sequence is not a statement of the law; nor is the latter statement a possibility, until all the elements of the sequence are understood.

The "traveller from New Zealand," if he came before his appointed time and took his stand within this hospital, might see one-half of the out-patients entering one room, and the other half another room; he might discover that the first group suffered from complaints of external organs, and that the second were the victims of internal disease; he might go further, and (waiving occasional mistakes or transgressions, and their penalties) might find that the individual by whom they were seen in one room was a surgeon, and in the other a physician ;—he might generalise the conditions under which this sequence of phenomena occurred ; but such generalisation would not be a "law." He might, from its regularity, infer the existence of a law ; but if he did so, he would at once refer it to something other than the mere fact of the particular order of events I have described. That which he would infer to be the law, and that which is alone worthy of that name, is the expression of the mode in which this institution has resolved to act.

Accidental coincidence, is not law, *a fortiori*, although sometimes it is more striking than invariable order. Moreover, it does not afford evidence that any law of the kind supposed is in existence. Yet the annals of science contain many illustrations of the one having been confounded with the other. Eclipses have coincided with abortions, comets with pestilences, and the changes of the moon with epileptic fits ; but it has yet to be shown that the relation between them is deeper than that of mere coincidence.

Not detaining you with any endeavour to show that *speculation* is not law, I pass on to the other fallacy, viz., that of confounding *statistical results* therewith. The numerical method of estimating facts has been, and is, of great utility ; it has pointed out the direction in which truth lies; but the statement of a percentage is not the utterance of a natural law. At the best, we know but fractions of the truth ; the numerical method enables us to state what those fractions are : as a method of inquiry, it is invaluable ; but, if its results are regarded as final, it is useless, or worse than useless.

If in one hundred cases of a certain disease, say "continued fever," there are sixty which present a particular form of eruption, twenty which do not, and twenty which exhibit another, a statement of percentage to that effect may be valuable, proving either that the name was wrong, for it included too much, or that the eruptions alluded to were neither of them essential to the idea of fever. If, however, inquiry stops at the enumeration of these facts, it is of little service. If the statement of these facts, and the proportion in which they occur, is regarded as a law of "continued fever," and the conclusion is that the name is correctly applied and that the facts vary, then the numerical method is worse than useless; but if the mind advances, and eventually demonstrates by this method that there are essential differences between the cases referred to, then the method is of great utility, in eliminating error, and pointing out the direction in which an important truth previously lay concealed. But the truth, or the law, is not expressed by percentage. The two or three forms of fever are absolutely distinct; and the statistical statement was but the sign-post, showing whither the inquiry should be carried in order to prove their distinctness. Again, the difference between a law of nature and a so-called statistical law is further seen in this, that the former is true at all magnitudes, times, and distances, whereas the latter is true only at such magnitude, time, or distance, as shall be sufficient to lose or hide the individual in the multitude. For example: the law of gravitation is true of two grains of sand, or of two planets in the solar system; the law of atomic proportion is such that the relative quantities of calcium, oxygen, and carbon are the same in the faintest line of chalk drawing and in the mountain range; the process of assimilation is the same in the infusorial cell and in the brain of man; the seedling oak contains the same elements as the giant tree of the forest from which the acorn fell. But try a so-called statistical law by such test, and it is at once proved unworthy of the name. If twenty thousand out-patients are relieved annually by this hospital, and the number varies but little from year to year, it is not equal daily, but varies widely from day to day. It is affected by weather as much as disease! The annual average mortality of a particular ward will not bear such division that it can be applied as a law to the individuals now lying therein. The law, so-called, that shows the chance of a railway accident to be an almost inappreciable fraction in the particular journey that you are about to take, affords little consolation to you if you are jammed up in a tunnel;

nor will it—although you ought to lose only a fraction of your finger-nail as the result of a collision—save you from losing your head, if, as unfortunately happens so often, the appropriate conditions are provided.

If the statement is—and it may be quite true of the multitude—that of ten thousand individuals, one hundred must suffer something, be it accident, disease, or death, neither this statement, nor the proportion, can be true of a less number than one hundred, for the same proportion, carried out, would with a less number affect only the fraction of an individual. If the statement is that of one hundred cases of particular disease, such a symptom should be present in twenty-five, that law applied to four individuals is, that the symptom should occur in one; but, in a given individual, only a quarter of the symptom should occur. We say, in such instance that the "chances" are three to one against its appearance; but, if the moment these statements have to be applied to the individual we have to change our phraseology, and speak of *chance*, what has become of our so-called law?

To illustrate this principle still further, let me employ some statistics furnished by the Royal Humane Society in the *Times* of September 5. From these it appears that during thirteen years 1,015,853 persons skated in the Regent's Park, and that during those thirteen years, 274 individuals met with accidents of different kinds: the general proportion, or numerical law, therefore, is, that 1 in 3,707 individuals should be victimised during this amusement. Now this proportion is so near the truth that it agrees, almost precisely, with that furnished by two periods, each of six years' experience, in the same locality. We divide the statistical law by about two, and find that of 498,283 skaters, 129 met with accident, the proportion being 1 in 3,862. Again: the numbers injured in periods of three years are very nearly identical, being 1 in 3,909, and 1 in 3,836; or, omitting the last two figures for the purpose of easier recollection, the proportions are—for thirteen years, 1 in 3,700; for six, 1 in 3,800: in the former three years, 1 in 3,900; in the latter, 1 in 3,800.

But, if we divide still further, the statistical result becomes variable, and the so-called law defunct; for in particular years —to say nothing of days—the proportions vary from 1 in 1,237 to 1 in 37,191. From this it is evident that a statistical result approximates the truth in proportion to the distance to which it is carried from the particular fact with regard to which the statement is made. So long as the number of skaters ranges between tens of thousands and hundreds of thousands, the results are unequal, but when the numbers are between hundreds of thousands and millions, the results become nearly uniform. It is, then, interesting to observe that although in consecutive years the proportions are so various as to range from 1 in 1,200 to one in 37,000, yet that in triennial periods these very inequalities are reduced to an inconsiderable amount. Hence, though the variations are great, these variations have limits. Herein is the treachery and also the value, of statistics. It is not until the numbers have accumulated and are so large as to include all sources of variation that the result is true to nature, and therefore uniform; then it is so, but it loses its direct utility and applicability for the individual; and that which is a law for the multitude becomes, so far as its application is concerned, a *chance* for the unit or the hundred.

It seems that in periods of three years, and in about a quarter of a million of skaters, every variety of folly, hardihood, and clumsiness on the part of the skaters, every variety of blunder, carelessness, and officiousness on the part of the icemen, and every treachery of ice, in its early brittleness and commencing thaw, must be included; the limits of variations are reached, and the results are equal:—1 in 3,751 is (not killed, but) visited with accident. But if, when this next winter comes, two of you start for the Regent's Park—not to any other park, for the proportions differ—persuaded that the chances are 3,751 to 1 that you will not go through; and if 3,749 individuals visit the same park, with the same persuasion, and one which is warranted by the facts, and applies equally to all, what becomes of the statistical law when one of you two receives a ducking? It amounts to this, that the chances were not equal for the two, but that it was from utter ignorance you thought they were: they differed as widely as they possibly could; and therefore, that the statistical statement is not worthy of the name of law. Further, if the statistical law could be accurately applied to the individual, so that his particular chances could be known beforehand, the practical utility of the law of probabilities would be annihilated. A moment's reflection upon the principle of life insurance will prove this. If, so far as human intelligence extends, it were not a mere chance that A and B, whose ages are the same, should have the same expectancy of life; but, if on the contrary, it could be known that A would live thirty years, and B would die in three, the former would not now insure his life, and the office would refuse the latter. It is because statistical results are true only of the multitude, and uniform only in regard of large numbers, that the individual can derive advantage from them. It is because the so-called law for the many becomes a chance for the unit, that the law of probabilities has a practical utility.

Perhaps the most unwarrantable conclusion which has been drawn from the employment of the statistical method is to the effect, that because events occur in such order that their numerical frequency may be calculated beforehand, therefore neither God nor man, neither Divine Providence nor human will, are operative in the world. Because there is a certain average number of suicides, for example, per annum, individual choice and general Providence have had nothing to do with the matter. To arrive at such a principle as this, at the conclusion of a survey of the history of civilisation, would be, in my judgment, to conclude in opposition to both historical evidence and true reason; but to start with such proposition, and to employ it as a method of investigation, is one of the most extreme examples with which I am acquainted of a *petitio principii.*

Allow, for a moment, that the principle is correct—viz., that the existence of uniform averages would exclude the idea of will, either Divine or human, the past history of the world, and its present history, are such as to show that these averages have not always existed and do not exist. The ordinary course of events has been suspended, or superseded, by the extraordinary or the supernatural, and the true basis of all nature has been revealed in such suspensions. But, further than to enter protest against such interpretation of history as this, is not my object now: it is to show that, even if the averages exist, they do not warrant a belief in the non-existence of will, either Divine or human. The proposition is this, that, because out of 10,000 individuals, say 100, in the course of twelve months, will do such a particular thing, therefore there was no will in the individuals who did that thing, or in those who did not. The argument in such proposition is erroneous; it is a conclusion with regard to the individual, from observation on the mass or multitude; and I have already shown that until the individual has been lost sight of in the multitude—*i.e.*, until the accumulation is so great that it includes every possibility of action and every variety of condition —the statistical result is demonstrably untrue: the statistical law loses all force, and has to be termed a chance, when applied to the individual, *i.e.*, to the very thing or being supposed to exert the will.

Beyond the fact of almost universal human assent to its existence, I know of nothing which proves more cogently the freedom of human will than does the application of the numerical method to the results of human action. Such application shows the presence of disturbing causes, quite out of the range of explanation by the mere crossing or combination of natural laws. No matter how complicated is the object to be examined, so long as it is under the dominion of physical laws alone, the net result of its action is soon arrived at, and may be stated in comparatively low ranges of numbers; but, immediately that you have for examination that to which moral and social laws apply, you have to derive your results from tens and hundreds of thousands. Two healthy individuals of equal age, weight, and height, affect the physical atmosphere of this room in the same manner and to the same degree. Here you may soon calculate all the possibilities of variation, and state them in numerical terms; but between two individuals, side by side, how vast is the difference, when regarded in their capacity to affect the moral and social atmosphere! Alike in the laws they cannot transgress, the net result of their lives physically—so far, that is, as mere physical elements have been employed—is almost identical; but the difference between them is almost infinite when they are viewed in relation to the laws they can disobey. The fact that human actions, as studied in large multitudes, result in tolerably uniform averages, is evidence that man is under the dominion of some laws which cannot be broken. The fact that such large multitudes are required in order to furnish uniform results, is evidence that man has a disturbing power; that he is able to set himself in opposition to certain other laws, interwoven with these—choosing to disobey their expressed commands, and to fulfil the law, by suffering the penalty attached to disobedience.

The possibility of calculating the frequency of some human actions shows that the power and the variations of the human will are, in regard of action, limited, and that by physical conditions. Man cannot will himself out of life, for example; he must, in order to commit suicide, throw himself under the dominion and operation of a physical law, which he cannot break, but which can destroy him; he must choose poison, or gunpowder, or drowning, or what not. Moreover, the implements from which he shall make his selection are not innumerable; poisons and possibilities of destruction have their limits; and thus the resulting actions of this hundred thousand individuals, and of that, may be nearly numerically identical in regard of suicide; but the very largeness of these numbers is evidence of the presence of disturbing causes which in extent and variety of influence will bear no comparison to any physical agencies.

It is by removing yourself to a great distance from the actual facts that the numerical statement of these facts exhibits uniformity. To the naked eye the moon's outline is an even curve—there are no inequalities, no changes in its form; but lessen the distance, or enlarge your power of vision, and then mountain ranges, valleys, and extinct volcanoes break the line. And so it is with man. Go far enough from the individual soul; lose his personality in the thousand or ten thousand that surround him—and the net result of this ten thousand and of that may be the same. But there are in him individual features—heights of aspiration and depths of despair, angry passions, and Divine helps; and these, seen in the unit but lost in the many, are the real moving forces, the determining causes of all his actions.

In thus surveying the aim which, as students of the medical profession, is placed before you, I have shown that the subject-matter of your study, LIFE, is two-fold—mind and body; material and immaterial; temporary, tangible, and seen; unseen, intangible, and eternal: and further, that the gulf between these two is such that no science has yet bridged it over, and no speculation, launched from either shore, has done other than find shipwreck in the abyss. Yet that each is true, is near to us and within us all; that our life-study will be but one-sided unless it embraces both, and imperfect unless it finds in each the hints and proofs that they come from the same source, obey the same laws, and work out but different parts of the same great purpose.

I have urged upon you, that although you know not—may never know—the essence of life, yet that you may learn FACTS about it; that the object of your study, then, is truth, for the acquisition of which all your care and all your industry are required; that you must arrive at truth by avoiding the mistakes of confounding facts with either fancies, hypotheses, opinions, or half-truths; and that by using these facts and this knowledge as your alphabet, you advance to the study of LAW; that in it you find the suggestion of something beyond the mere facts themselves—the conception and revelation of a higher power, and of a plan which gives harmony and meaning to the diverse phenomena you witness; and you trace a purpose which the processes of nature are gradually but surely developing. I have urged upon you the differences to be constantly remembered between law and generalisation of sequence or coincidence, and between natural law and numerical results of law.

Thus your aim is to learn the truths or facts of a two-fold life, and to find in its deepest laws the revelation of that which is greater than itself. Life, life of two kinds. Truths about it, not untruths ; and the reference of it all to a higher source.

For the reconsideration of your aim no time is more appropriate than the commencement of a new period of your work ; but if you advance in this work—and in proportion to the rate of your progress—it will become every year more important that you should take this review. For at every step in our upward progress toward some height of science, the horizon widens, and with new wonders and new beauties there are new elements of confusion, and we may be baffled by the very largeness of our view. Pressing onward, we see that beyond some clear and hitherto limiting line there are depths into which our vision cannot penetrate, further than to see that they contain, in lavish profusion, wonders and beauties equal to those around us. The summit of yesterday's is but the starting point of to-day's exertion ; and as the circle enlarges, it is at its circumference that the increase lies. The rate of increase is accelerated, and the objects that surround us seem infinite and overwhelming, by their largeness, their number, and the marvellous intricacy of their combination. Life is too short to see them all. We must choose our path : we must leave much unseen, still more unthought of, and an infinitude unknown. For as we ascend still higher, we catch glimpses of the far off sea—the infinite, unfathomable, Unknown—that mighty ocean of unknown truth that lies beyond, around, and beneath all our knowings, which confounds and wrecks every venturous barque that launches forth upon its mighty waves—that vast waste of water, sometimes dreary and bodeful as the grave, but sometimes bright and beaming as the sky ; sometimes blazing with the sunlight, and again silent and sorrowful as the pale light of stars. It is only when we have attained, and can look out from some height of science, that we begin to see and know how vast is the unknown and how, compared with it, dwindles into nothingness the little that our powers have yet taken in. The mightiest of philosophers felt that he was but as a child gathering pebbles upon the shores of that boundless sea ! But we have to come down from these heights to every-day life and work: to know how to advance, and rejoice in the vision that each day's scientific progress yields; but, at the same time, to find among the wide fields of scientific fact those principles which shall guide us in the prosecution of our real life-work—the alleviation of the sorrows and sufferings of humanity. These principles you must learn by means besides those of chemical experiment and dissection: you must learn them in the hearts and lives of your fellow men. You must come to know the meaning of the infant's look—to understand the tone and teaching of its cry. You must appreciate the patience and long-suffering of woman, and the hardihood and rough exterior of man: you must look, and see beneath these, if you would measure the true degree of their affliction. You must learn to feel with and understand the feebleness of age, and gain all that is required for your ministration to its wants, from those hints that come to you through the failing powers and closing avenues of a soul that has for a long while battled with a world too rough. True sympathy will reveal much to you that science cannot see. Wherever there is life, there is your field of study—wherever there is suffering, there is your field of work; and truly to relieve its burden your spirit must be that of Him, whose life was the perfect life—whose presence and word brought peace and health, and into whose work in this world it is our highest aim and highest dignity to enter.

But in such exercise—in loving your neighbour as yourself—you do but fulfil the duty incumbent on you as a man. As a medical practitioner, there is for you other work, and work which is peculiar to our profession. The medical practitioner has to educate—by converse, by life, and practice—those whose education is less specially scientific than his own. He is the exponent of the real method of arriving at scientific truth; and it is his part to show that in action he can lose sight of minor differences in scientific creed, and can combine, with those who differ from him, to employ common truths for the advantage of his fellow-men. The man of science is the apostle of the true spirit of inquiry—he is the humble investigator of nature's plan. Submitting himself, with confidence and entireness, to the truth as taught by nature, he is the abject slave of neither institution, party, clique, nor self: he utters his protest alike against servile dependence upon authority, and against the rabid independence and the folly which would rely entirely upon itself. He sees that, to ignore the teaching of the past, is to cut off from himself the rich entail of scientific treasure, and to impoverish the present—that to yield no honour to institutions is to oppose the common sense of humanity, and to do away with all standard in regard of truth; but he also sees that to receive the teaching of the past without question and without addition is to introduce retrogression or stagnation into science, and to render the future even worse than the present day; and that, to despise individual exertion and conviction, is to rob institutions of that which supplies the conditions of their existence, and gives authority to their words. If there were nothing to which we could appeal, it would matter little which guide we might choose to follow; mere temperament would decide whether we should rest contented with the dogmata of the past or should follow the speculations of the present; and in either case, our science would be but an empty dream, our action would be but a delusion and a sham, our profession a mere guild, maintaining itself upon the superstitious fears of those not quite so knowing as itself. But the Court of Appeal exists, and is ever open: nature is open before you, as it was before the fathers of our science; and to it, with as much confidence as they, you can apply for instruction. Common sense, educated by both the wisdom and the follies of the past, and common honesty universally applied, will enable you to ask questions and receive their answer; but you need more than these—you need a simple child-like trust to free you from preconceived opinion on the one hand, and from self-confidence on the other, and to make you as open to learn as nature is to teach her lessons.

And finally, amidst the petty jealousies, the party bickerings, the presumptuous ignorances, the pharisaic prides, and mock humilities that do so fetter the limbs of men, and bind them up into such little bundles of humanity, that they can do nothing in this world but harm, unless they may do it precisely in the way their own fancy, their great grandfather's fancy, or their party's fancy dictates ;—against all these littlenesses, that make us almost ashamed of the race to which we belong, it is the part of the man of science to utter his strongest protest, the protest of example. To show that though he and his brother may chance to differ about the nature of ozone, they can yet clasp hands heartily and join in works of science and of charity. To show that his aim is such, that even if the method his brother adopts to learn "the facts and laws of life" does differ from his own, yet that he has so learned—from a higher source —the duties incumbent on him as the true man of science, of art, and charity, that he can join that brother in utilising his knowledge in every way, and to the highest degree for his fellow-men.

THE TYPES OF STUDENTS:

Being an Introductory Lecture delivered at the opening of University College, Session October 1st, 1863.

GENTLEMEN,

The office of Special Professor of Clinical Medicine, which it is my honour to hold in University College, has furnished me with opportunities for the study, not only of patients, but of students; and I purpose to-day to present you with some of the results of those clinical observations which I have made upon the latter.

The term "clinical lecture" is often applied to a discourse delivered elsewhere than at the bedside of a patient. In like manner a familiar phrase is often used to denote a species of exhortation, or it may be rebuke, administered at other times than in the hush of night, and under circumstances of less privacy than the "curtain" might secure. If, then, I denominate the remarks I am about to make "a clinical lecture upon students," common professional usage of words will be on my side, if strict etymology is not; for those remarks, although delivered in a theatre, are founded upon observations conducted, for the most part, in the wards. And if anything I may say should seem to have the tone of exhortation or rebuke I wish you to think that such message comes to you from the other side of the curtain, where lies the patient, not any individual patient, but the great suffering world, which is at once our study and our care.

It is towards clinical work that all medical study tends; it is at the bedside of the patient that our science culminates, and becomes an art. The case with which we come in contact is, as it were, the medium through which correlated forces become exchanged; or, to alter the figure, the reflective centre in which all the knowledge we have laboriously gathered from without becomes converted into power for the patient's good. It is well, therefore, to keep this end in view, and to regard all our studies in this their high relation. The bedside of the patient is the point from which to value correctly all scientific medicine; and it is from this standpoint that I would now address you. And in delivering a clinical lecture upon students I shall not depart from the plan I usually adopt, but shall commence by giving you a picture of the cases that I wish to bring before you—they are five in number. After having described them, I shall advance to a consideration of their pathology; but, first, let me sketch these cases as you may have seen them, and may again see them, in our wards.

Case I.—Cyrus Vane Velox is between nineteen and twenty-four years of age. His last year or two have been nominally spent at the College. It was observed while he was there that his attendance upon lectures often assumed a remittent form; that occasionally prolonged intermissions occurred; that the intervals between his paroxysms of attendance gradually increased in length, and that some curious repulsive influence seemed to become developed, not only between himself and the lecture-room, but between himself and the professor; for it was noticed that upon each period of his return he withdrew himself further and further from the professor's position in the lecture-room or the theatre. At first he sat in the lowermost rows of seats, and occasionally took notes of the lectures that were delivered; but afterwards, having eaten his pens, he was reduced to the necessity of making such notes and illustrations as he could with his penknife on the surface of the benches. A disadvantage attached to this process was that he could not carry these notes away for private use; but he succeeded in taking his notebook away, and it was subsequently ascertained to have passed gradually from the desk to his pocket, from his pocket to his locker, and he appeared quite devoid of it after a little time, having substituted for it a walking-stick, the proximal extremity of which he usually kept in his mouth as he sat at the top row of the theatre, or removed it from that locality only to make slightly audible rhythmic movements upon the floor. Another fact noticed about him was that the commencement of his attendance upon individual lectures became gradually delayed ; so that on one week it was five minutes past the hour before he arrived, the next week ten minutes, and so on until he disappeared altogether. A curious infirmity affected him in the dissecting-room. He was usually seen seated between his " upper " and his " Ellis," as unhappy as if he were about to be dissected himself; and looking abjectly into mid air, as if he expected that anatomical knowledge might by some strange occult projection penetrate his own " head and neck," and perchance remain there. But instead of this happy result he soon verified in his own experience the old anatomical and physiological discovery that there is a passage by which truth that has entered in at one ear may very readily pass out at the other. And so, instead of " cleaning the muscles " he cleaned his scalpels, cut up his " part," or allowed some one to do it for him, and promised to himself to " get up his anatomy " at some time or another by the aid of one of those rotatory machines which must be nameless.

Having thus finished at the College, he came across to the hospital and was admitted. A delay appeared to attend his admission, and in a chronic form it affects him still. It takes him generally from ten to twenty minutes to get through the lobby of the hospital, and he has been known sometimes, so great is the obstruction, to get no further. A casual observer might think he was not trying to effect the passage, as he often seems to be standing with his face to the street, conversing with others afflicted like himself, and producing severe " portal congestion " of the institution ; or sometimes talking even to the out-patients as they pass the door into their waiting-room ; but his conversation has not, so far as I have observed, been directed to the discovery of their diseases, his principle of selection amongst these out-patients, who are rarely if ever of the male sex, appearing to be rather closely associated with the presence of good looks and the not very conspicuous presence of modesty. The stick with which he broke out a year and a half ago is still visible, there is often a want of correspondence between the vertical line of his body and the median line of his hat, and the detrusion of the latter towards one or the other side has of late shown a marked tendency to increase. This little symptom has been observed a great many times, and its exacerbation has been thoroughly established. There can be no doubt of the correctness of the observation, for our patient usually keeps on this appendage of his when others are in the habit of removing theirs. After, however, the considerable delay occasioned in the manner I have described, our case arrives in Ward III., and the "present state," as entered in my notebook, is as follows:—

C. V. V——, found sitting, with his hat on, upon the corner of the table in the middle of the ward; thus, during the early part of the visit, maintaining as great a distance as he conveniently can between himself and the patient first examined. Moving gradually towards the fireplace, he places his back opposite that calorifying arrangement, so that he can take a comprehensive view of the ward by seeing all the patients it contains at one glance. He yawns frequently, comes into the outermost circles of students around the bed, looks first over the shoulders and then under the axillas of those in front of him, fails to see anything of the case under examination, and so talks and jokes with his nearest neighbour, not loudly, but in a tone which does not materially assist those who are commencing the practice of auscultation. He walks to a distant bed, looks knowingly at the bed-card, sees the patient's name, age, and occupation; makes his diagnosis by reading that which is written on the card; judges of the treatment by smelling the bottle of physic; is thus able to say there is a case of rheumatic fever in Ward III.; and having ascertained that important fact, he seizes an opportunity, when the physician appears to be looking the other way, and rather quietly—out of consideration, let us now hope, for those who are listening to cardiac murmurs—he takes his leave. The periods of his return to the wards are singularly uncertain; but it has been observed that they bear some curious relation to lunar time, and that they are often synchronous with the recurrence of those days on which the names of students have to be entered in the book kept near the door. It was most mercifully arranged that this book should be kept so near the outer door, for the fatigue occasioned by effecting the passage of the lobby was often so great that all our patient could accomplish, after he had encountered it, was sometimes to take fresh air in the operating theatre or entrance to the dead-house, or when not equal to these exertions to return into the street. Towards the end of each session there is a singular propensity for his reappearance in the wards; and it has occurred to some of the medical staff that this may be determined in some mysterious manner by the presence of an unsigned schedule in the pocket. I do not insist upon this explanation, but whatever may be the theory the fact is one which has been frequently observed, and which I have no doubt some of you will observe again.

There are some negative characters in Vane's case that are worthy of notice. He never obstructs the house surgeons' or physicians' assistants in their morning duties. It is confidently asserted by some who know him that he was never seen in any one of the wards before one o'clock. Again, he has never complicated the work of the physicians and surgeons in selecting either clerks or dressers by placing his name upon the list of candidates for those most valuable appointments. It is a rule of the hospital that no one shall appear within the area of the dead-house during a post-mortem examination except the physician or surgeon and his assistants engaged in conducting it. This rule, often broken by others, C. V.—— most diligently observes; and, indeed, he is so scrupulous to avoid even the appearance of this evil that he absents himself altogether from the room. He may, however, be observed in the operating theatre when there is anything exciting to be seen; but even in this place he is faithful to the law of his being—viz., that of maintaining as great a distance as is possible between himself and the object he is supposed to study; and it is well known that he never makes himself acquainted with a case before it is submitted to operation, and that he never troubles himself to learn its subsequent history. Thus his view of the nature and value of operations is somewhat broad, and the breadth of his view is often expressed somewhat freely. I remember one of the family of young Vane, who was in hospital some years ago, giving very decided criticisms upon the operations of Mr. Liston, and enlightening the students of his own class as to the improved manner in which he would have treated the case had it been so fortunate as to have been placed under his care. You will often find this combination of great learning and great modesty, just as you do elsewhere that of great ignorance and great presumption: they are two affections having an interesting clinical association, developed often *pari passu*, and forming, as it were, the right- and left-handed accomplishments of a college course as it affects an individual like young Vane Velox.

Enough has been said to enable you to recognise the case. I shall advance to a consideration of its pathology by-and-bye, but will now sketch for you another type of malady by which some students have been known to be affected, and which was well represented by—

CASE II.—David Superficialis Hurry. This gentleman entered college, dissecting-room, laboratory, and hospital at once, and he has been in all of them ever since. He was in his fourth year at the time my notes of his case were taken, and this was his "history." He had attended and taken notes of every lecture that it was possible for him to attend; sometimes, indeed, so busy was he that he gave finishing touches to his notes of that on physiology while the lecture on chemistry was going on. He had dissected the body several times in all its parts. He had gone through the courses of practical chemistry and practical histology. He had been both clerk and dresser. He had taken notes voluminously. There was a very complete body of medical science in his reams of manuscript. So large was it, however, that it was like the Sphinx upon a close examination, and

D. S. H—— wandered and climbed over it in vain to find the features, the facts, or principles that he wanted; but he had the satisfaction of believing, as he looked upon his shelves, that they (the facts or principles) were there, and he hoped that upon some future occasion he should be able to sort this objective knowledge, make a catalogue and index of the library he had created, and turn it to his real advantage. As yet, however, he had found no time for this worthy end. He was generally in a desperate hurry; the day was too short for him, and the night often saw him performing the well known process of "consuming midnight oil" in the futile attempt between his snatches of sleep, to bind into bundles the numerous broken sticks of science he had so assiduously gathered through the day. His great trial was that he could not manage to be in two places or hear two or more lectures at the same time. The attempt to accomplish this he had relinquished; but often, even recently, he was known to have tried to do some two or more things at once, and this he performed with the success commonly attendant on that process.

Now, in his fourth year, he comes before us in Ward III. at 2 P.M. He has seen all the patients in the hospital this morning, having "gone round" at a "double quick" with or without the house surgeons' or physicians' assistants. He is fresh from an operation, where, one of the dressers being absent, his fingers, ever ready, were found of use; he is bent upon a post-mortem examination to come off immediately; the clerk is away, and he is to take the notes. The skin department, the eye department, the dental surgeon, the obstetric physician, have all been attended at their proper times. There is not an inquest at which, somehow or other, his evidence is not required; not an accident which does not fall in his way. He is even present in the casualty room at midnight whenever a drunken cabman is brought in for the stomach-pump and cold effusions. He feels the crepitus of every broken bone; he hears something of every cardiac murmur; he percusses every morbid chest; he handles every morbid specimen. He seems almost as ubiquitous as he could wish to be; he is up both early and late; he gives himself no time for rest, no time for play. He is in a condition of educational pyrexia, and even when he sleeps exhibits a "low muttering delirium" of broken bones, triple phosphates, rheumatic fever, and typhoid spots.

The case of D. S. H.—— is an example of extreme disturbance, and is interesting on account of the rarity with which the affection is met with when carried to so high a degree of intensity. It usually proves fatal long before it has reached this pitch. But the same malady milder and somewhat modified in character, is very commonly observed. Cases radiate around types, which may be regarded as the centres of large groups of diseases; and it is convenient, for the purpose of contrast, to describe these types. I wish you, therefore, to retain Hurry in your memory, for I shall have presently to analyse his affection; but before doing so I must bring under your notice another case equally important and interesting, that of—

CASE III.—Chemicus Profundus, who is a fair specimen of a malady not very unfrequently to be observed in our wards. C. P—— had a taste for chemistry when he was quite a boy, and upon several occasions horrified his venerable parents by his early scientific experiments. Once he wrote with phosphorus upon their bedroom walls, so that some ghastly letters gleamed at them in the dead of night when their rushlight accidently went out, and they started with terror equal to that of the guilty Belshazzar at the incomprehensible writing of his doom. Upon the occasion of a small family party he mixed that faithful article of the tea-table, carbonate of soda, with pounded sugar just before it was to be eaten with red-currant tart, so that the said tart effervesced most energetically upon the plates of the guests and lost the charm of colour. During his apprenticeship, when, as became the dignity of his new position, he of course gave up childish tricks, he was noticed by his master to care little for anything but the chemistry of that early period of his career. True, he looked at the bones of the well articulated skeleton that hung in the surgery cupboard; and he advanced in osteological study so far as to know the occipital from the astragalus; but his chief delight was found in calcining some bones and dissolving others. True, he learned the difference between exogens and endogens—between mammalia and insects; but his favourite occupation was to catch the gases that rose from the valisneria leaves in the aquarium, to experiment on every drug in the dispensary, and to compose and decompose multitudinous mixtures which were not prescribed for the patients in his master's day-book. When he entered this College, four years ago, his eyes gleamed with delight over the syllabus of our chemical professor's course, and he attended the lectures on his favourite science with a zeal and regularity that were to himself both profit and pleasure. He was always at his post, and between the hours of lecture was to be found in the library diligently mastering, step by step, the grand science that was brought before him. Books differing in opinion helped him to understand each other; and he often puts his theoretic knowledge to the test of experiment. The other students knew well that he could help them in their puzzles, and he was often appealed to with success to solve some mysteries that had defied their efforts. He attended the other lectures of his year; he dissected; and was a diligent student generally. He competed for honours in the classes of anatomy and physiology, but obtained only very low certificates; while of course he gained, as every one knew he would do, the gold medal in the class of chemistry, and his papers were such as have seldom been presented by any student of the college.

At length he came over to the hospital for clinical study. His honours at once secured for him the office of clinical clerk, and here he had many opportunities for considerable chemical research. He ingeniously managed always to secure for himself those cases in which some special interest attached to the examination of the secretions, and these he noted with a carefulness that did him the highest credit. But it may be observed, now that his clerkship is completed and he is pursuing his own way in the wards, that he often passes over some of the most important features of a case in order that he may be quite accurate about some, as yet understood, unimportant detail. It is said that C. P—— could tell you correctly all the daily changes in the urine of each case of pneumonia, chorea, and gout that has presented itself during the last twelve months; but that he would be puzzled to distinguish a case of pneumonia from one of bronchitis, and that there are many forms of disease of which he scarcely knows the names. A relative of C. P——, who was in the hospital some years ago, exhibited a similar affection, but it took another form; and the result in him was that he was thoroughly *au fait* in all chest diseases; his ear was tuned to the detection of the very finest departures from healthy sound; "he knew," as his fellow students used to say, "his Walshe by heart;" but he was sorely perplexed to make a diagnosis when examined for the office of physician's assistant. Indeed, the case was one that baffled him completely. He made out the presence of sonorous rhonchi in the chest; he was confident that he heard some fine crepitation at the junction of the middle and lower thirds of the posterior surface of the left lung—the resonance was defective there; and he occasionally caught, as it were, the dubious ghost of some grazing friction. On these points he was as clear as noonday; but he failed to see that the patient was suffering from measles.

The last class of cases that I wish to bring before you is, I am glad to say, far from uncommon in our hospital. Perfect examples we do not expect to find often; it is rare for any case to resemble exactly that which is described in books. Nature does not move in the narrow ruts or lines along which our thought seems, as it were, compelled to travel. But again I say it is useful to consider types; and—

CASE IV.—Orbicularis Goodman is a fair type of the class to which he belongs. His brother—(Case V.) Longitudinalis—is here also. Their family and early history is the same; they are very much alike. I shall point out their differences as I proceed. Both brothers diligently attended to their college duties, having prepared themselves to enter upon these studies by some acquaintance with general physics and with those laws of thought which regulate all forms of scientific inquiry.

They studied equally each branch of knowledge; became competent, by their aquaintance with anatomy, physiology, and chemistry, to comprehend the principles of morbid change in both function and structure of the body; they attended lectures, when professing to attend them, with punctuality and regularity; but they did not waste time by going uselessly over the same ground again and again. They did not lose the continuous thread of information which a course of lectures can supply; but having gained that they used other means to confirm and enlarge their knowledge. They asked themselves and others, before commencing the study of a subject, what it was that they were about to learn. They acquired, as it is most important to acquire, some knowledge of the subject to be known; and thus they understood what it was they wanted to learn when they came to the hospital to use their own eyes, hands, and ears in the observation of disease. In their clinical work it may be seen that they follow this general plan. They attend for a time the practice of one physician or surgeon, and then for a time that of another. They pay special attention to four or six cases, endeavouring to select those which are examples of the same or of allied diseases; they compare them with each other; they compare them with written descriptions of such diseases; they endeavour to make out the causes of symptoms and their relations with one another; they hear what is said about them by the physicians and surgeons; they take time in their examinations, and go to see these cases in the morning as well as at the hour of visit; they master each case, and keep a careful record of it; they do not try too much at once; they endeavour to know thoroughly what they know at all; they are not afraid to ask questions; and they are very successful in the advance, not only of their knowledge, but of their power to know. There is this difference between them: the elder appears satisfied when he finds a case that corresponds exactly with a book; the younger is always trying to show his brother that the book is wrong. The one is disposed sometimes to fit his facts to the ideas he entertains of what facts ought to be and to strain them a little sometimes this way, sometimes that, in order to make the fit complete and creditable ; the other is so averse to believe that facts ever do correspond with statements that he sometimes looks at them through a distorting medium, and imagines that there are exceptions when there are only blank spaces or wrong entries in his own information. The elder sees things that do not exist ; the younger as often fails to see those that do. The one is ever trying to verify the wisdom of the past, the other to show that it fails to meet the knowledge of the present ; while the former looks somewhat hopelessly at the future of our science, the latter believes that it will witness the solution of every enigma, the unravelling of every tangled skein of truth. The two brothers, while they counteract, yet supplement each other, and help each other onwards in the pursuit of their common end, the acquirement of all that knowledge which, however imperfect it now may be, is yet the best that can at this time be brought to bear upon the sufferings and sorrows of their fellow-men.

The outside phenomena of five groups of cases have now been brought before you ; and in order to advance to a knowledge of their pathology I wish to point out the primary or essential fact in the departure of each from healthy action. This may often be found in the *absence* of some important principle or quality. Look at the *first* example, and see how certain defects disqualify him for the work he professes to have undertaken. He fails to see the greatness of that work. By his presence here it is assumed that he wishes to learn the science and art of medicine—*i.e.*, to know all that can be known of the most complicated set of phenomena that can be studied by the human mind. He requires patience and untiring energy, but he exhibits neither. He fails to see the value of his time. He cannot hereafter make up for the opportunities he is now daily allowing to escape unimproved. There is a want of consideration, a want of common sense, in a man's undertaking a work of great magnitude and treating it as if it were mere child's play. Lives have been spent by some of the greatest intelligences of our race in acquiring and arranging the knowledge with which he ought to become familiar ; and that man's intellect is defective who professes to study medicine and who takes no pains to do it. To attend lectures with irregularity, and to saunter lazily through wards filled with patients who might teach him what he professes to want to know, proves, I submit, à want of intelligence in the first case I have described; but, further, there is a want of honesty and want of heart. C. V——'s father lives in the country, and leads a laborious life. He is in constant and wearisome attendance upon the sick poor of a large union, or he is hurried from house to house to hear the oft-told tale of suffering and weakness—of miseries made tenfold worse by want. He spends the long hours of a winter's night in some wretched hovel, where the sorrows of a woman, because her hour has come, find *no* turning into joy that a man is born into a world so dark as hers. He has closed the dim eyes of some old labourer whose day of toil is done. The great mysteries of life and death surround him; he stands alone in his struggle with the sorrow and the suffering that beset him on every side; he has no colleague to cheer him in his work or to help his own wearied brain; all that he does is without the *éclat* of public position or the reward of fame. His family is large and his means are small; his wife performs household duties to which some fine servants would object; his daughters have but short school days, and then have to give out to others the little they have learned. It is all hard work in young Vane's home. And why? The father labours that his son may learn: he has placed him here amongst immense advantages; his small savings scarcely meet the hospital and college fees; but yet, while there is stint and toil at home, he saunters lazily about the wards and lecture-rooms, and never lightens, by the effort of one little finger, the great burden some part of which his broad young shoulders should have now learned to bear. There is want of common honesty in this, and want of heart; and this last he shows quite frightfully sometimes when he makes his visit to our wards. Let him not stare rudely at the patient just come in. Let him, if he will, handle, but handle tenderly, the palsied arm that has done much work when once it was strong as his. Let him not choose the wards for a rendezvous in which to chat idly with his friends about the boat race or the billiard match; but let him come with reverence and with uncovered head into the presence of disease or death, and feel that sorrow and suffering demand a respect which it is his honour and duty, as well as his privilege, to pay.

Leaving now the first case, the prognosis of which is by no means good, I wish to analyse the second much more hopeful specimen of student life represented by Superficialis Hurry, whom you will remember we found always in haste, and most ubiquitous in the distribution of himself. Praiseworthy as his energy is, he makes a vast accumulation of material which is of little use to him by reason of the confusion in which he leaves it. He has seized a fact here and another there, but he has not been able to bind them together. He often so learns the answers to a number of questions that he is "safe to pass an examination" if he is only fortunate enough to get the proper questions; but there are facts which lie between those questions and which throw light upon their answers, and these he has hitherto failed to see. The scraps of knowledge he has gathered are to him something like "cut flowers" standing in damp sand—varied and beautiful to look at, even doing something with the life that lingers in them but is quickly vanishing away; whereas they should be living things, firmly rooted in the earth they spring from; transforming crude into less crude material; raising the lower forms of matter into higher; assimilating much that is heterogeneous, and evolving new products as the result of their own inner life. What D. S. H—— fails to perceive is the existence of a deep-seated relation between all the facts that come before him; that they are, as it were, twined together by their roots; that they have a common holding to the earth they spring from, and that he must dig deeply who would learn their meaning; that underneath the surface phenomena he has scanned so slightly there are relations which cannot sometimes be seen or handled, but which may be appreciated if he would fully comprehend the phenomena he has witnessed. The manifold facts he has to learn and use resemble rather a mighty forest, with trees of an age's growth, whose brawny arms have other work to do than to bear sunwards their own leaves, and thus nourish their own life; for on them the ivy clings and plays its part, and their bark is stained by the busy lichen or is fringed by moss; while under their shade and protected by their care, flowers of a thousand hues give forth their scent, for a few hours wave their fragile petals in the air, finish the work that is given them to do, and then pass away: where life in all its forms is moving with restless energy, and moving towards the accomplishment of one great end; where the roar of the beast of the forest not only does his bidding, but, as it shakes the dew-drops from the gossamer, drowns a whole colony in that tiny flood, and so feeds the dawning life we fail to see; where the insect in its search for food scatters the pollen from the anther, and thus helps to renew the form it lived upon; where life in its thousand forms finds its great bonds of union and transformation in the earth and air; the roots deep down in earth seeking and finding in the darkness, amid crumbled rocks and ruins of past forest life, the very elements they need; the earth drinking in the rain that, as it falls through air, brings back again those seen and unseen fruits of their toil that the great live world above has filled it with; and over all the sky, with its marvellous, mysterious agency of light and heat, returning to all living things the powers that first called them forth or raised them to their toil. In Nature there is a wondrous unity of advancing purpose amid a vast circle of events; no link can be dropped from her mighty chain; nothing can be added thereto, nothing taken away. She is before us for patient and reverent investigation, and he will never learn "her secret meaning in her deeds" who is content with a hasty glance at the first facts that come to hand. No, he must trace each fact into its past and future; he must see how it came where it is, how it lives, and how it grows. He must follow the teaching, which Nature herself is ever ready to afford, that nothing is small, that nothing stands alone, that in darkness and "in silence mighty things are wrought," and that what we see is but the outcome of still greater things and forces as yet unseen. He must, then, work widely and work hard, but he must work deeply too, and in so doing his progress must be slow. He may, and will, find his knowledge less showy, but more real; it may even be thought less of by some around him, but it will be of far higher value to himself.

There is a caution, with regard to clinical study especially, which I would give to all who are in any degree affected with the malady of Hurry. It is that they should never allow themselves to sacrifice accuracy and thoroughness of information at the shrine of definiteness. There is something very charming, very easy to remember, in broad lines of distinction, and such lines are often highly useful; but they rarely go down to the bottom of a matter, and are often on the barest surface only. It may be enough, in order to enable you to distinguish between two particular individuals, to say that one wears a violent Albert chain and the other a broad-brimmed hat; but such characteristics do not by any means exhaust the differences detween a dandy and a Quaker; and if they were taken to do so your generalisation might be broken to pieces by the experience of to-morrow. There are diseases which may sometimes be distinguished from others by the presence of one symptom; value it, but value it correctly; and remember that in every case you have a whole body for your study. And do not rest satisfied with applying some little fragments of your science to the mere fragments of a case; but bring all your knowledge to the interpretation of every case, and depend upon it you will not often find that you have one grain too much.

Now, let us see wherein it is that our *third*, painstaking student—our devotee of chemistry—is at fault. He has worked well at his favourite study; he has partially, but not utterly, neglected other portions of the full curriculum of education. Unlike D. S. H——, he recognises the importance of digging deeply in his work, but practically this deep digging is carried out only around his own favoured plant. He will examine its tiniest root-radicles, and the bristles upon its most distant leaves. He knows all its aspects, and has recorded with praiseworthy care every detail of its growth and change. But of other plants he knows but little; and he feels almost an approximation to contempt for those who do not move along the line that he has chosen. He recognises the marvellous interdependence of all Nature's works, and the analogous relation between all branches of science. He sees that physical science, to be complete, must embrace those properties of matter which have to do with the proportion in which one kind of substance combines with another ; that the idea which we form of an elementary body is based upon the possession by that body of a certain group of physical qualities differing from those which are presented by another ; and thus that physics and chemistry are not distinct sciences, but parts of one comprehensive view of the substances by which we are surrounded. Further, he sees that, in order to understand all these properties of matter, he must trace out their behaviour, not only in the so-called inorganic but in the organic world ; and that a full natural history of any element cannot be said to be written until its presence and effects are known in both the vegetable and animal kingdoms ; and yet further, that the knowledge of these must embrace not only the processes of health and growth, but those of disease and decay. Thus he is right in holding that all our science is but one great science, and that the lines which we have found it convenient to draw between this branch and that of the great sum of knowledge are always artificial and often wrong ; that all systems of classification—whether so-called "natural" or not—are but human systems, tinged by error and dwarfed by ignorance ; that the only really natural distinctions are those which Nature herself presents—viz., the distinction of individual from individual and of element from element ; but that we are as yet by no means certain that we have absolutely accurate tests for the recognition even of these, as it were, final or primary distinctions. In perceiving them, however, we come face to face with Truth. When we attempt to advance further, all that we do is to gain glimpses of a mighty order that we fail to grasp ; the arrangements we adopt follow the leadings of our own but partially instructed minds ; and in all the statements that we can frame about them we of necessity introduce the elements of incomplete observation and of imperfect thought. But what C. P—— fails to appreciate duly are the greatness and many-sidedness of Nature's works and also the present imperfection of our means for knowing them. True, an absolutely perfect science of Chemistry must embrace all knowledge ; an absolutely perfect Physiology must do the same. But we are far from having attained to these, and cannot reach our goal by starting from one point and advancing through one avenue alone. Dealing with so complicated a phenomenon as Life, we must approach it from many points : we must start from the side of Physics, and also from that of Chemistry ; we must advance also from those, as yet unreduced, Vital processes, and again from those of our own Consciousness and from the facts of History. We cannot yet see the point in which all these covering lines may meet ; but in the meantime, believing that they do meet, we must work and travel, not on one line alone but upon each and all, and so approximate the knowledge we may even at the last fail to possess. Work, then, as deeply as you can, but look around you also. Do not neglect a fact because it stands, as it would seem, apart, or because it is of some order that differs from your own favourite study ; do not think it worthless because you cannot verify it in one particular way, but learn to verify it in another : gain all the knowledge that you can from all sources, and bring it all to the interpretation of any phenomenon or process that you are endeavouring to understand. There are many life-processes that cannot be estimated by the thermometer or the scales ; and they have a value of their own. The manner of respiration will often teach you more than the number of inspirations in a minute ; the quality of a pulse will often give you more insight into a case than will its frequency ; an expression of countenance will, not rarely, teach you more than a chemical examination of secretions.

The last cases (the fourth and fifth) which I brought before you were those in which time and labour were well spent, and would inevitably bring their reward. Before they commenced medical study the two brothers Goodman knew something of physical and mental science. Preliminary education cannot well have its advantages exaggerated, but I am far from thinking that feats of mental gymnastics in respect of classic lore have any direct influence on the success of a student of medicine. He must be "in good condition" mentally, and no man gets into that good condition without some "training." A part of this training is the study of the languages and literature of the past; but for its immediate influence upon his scientific career it is of more importance that the student should be familiar with modern languages, and especially with French and German. It is, however, of essential importance that he should be well versed in the physical sciences. No man can make much of anatomy, chemistry, or physiology unless he knows something definitely and scientifically of the great laws of matter. The fact of having studied these, of having learned the mode in which they are to be investigated, and the nature of the processes by which hypotheses are to be verified or refuted, will place him on vantage-ground in his studies here. He will understand what is the value of a "fact," what is the nature of a "law," and what is necessary in order to regard the one as proved, the other as established. And almost inseparable from a knowledge of physical science is an acquaintance with the nature and order of those processes of mind which are common to all kinds of philosophical investigation, which the child or the savage may apply with instinctive correctness, but which the man of science will use but ineffectively unless he has arranged and analysed them. I do not think that the medical student will be any the better qualified for his work by having his brain filled with metaphysical questionings or ontological speculations; but I am quite sure that a systematically arranged knowledge of the greater and simpler laws of reasoning and of thought will enable him to appreciate much more readily than he could without such knowledge the wide range of phenomena which will come before him here. Thus armed and fortified, the two brothers commenced their attendance upon lectures in this College; and they made, in the manner I described, appropriate use of those great advantages. I cannot but regard lectures as such, though some in the present day speak of lectures as though they were remnants of an antique species of torture, fit only for exhibition in the tower of London, with waxwork models of our learned professors, as specimens of a crude state of education now happily extinct. But I think that the lecture has powers for good which nothing yet devised can supplant. The book brings the whole mass of information before you at once; the lecturer gives you day by day the proportion you may take in and assimilate. The book is a dead thing—a moveless, emotionless conglomeration of words, which you may stare at and try to comprehend, but which cannot see or feel your difficulty, cannot change its phrases, and cannot fill up those gaps in your knowledge which prevent your appreciation of its meaning. In the teacher you come in contact with a living man, who sees whether you do or do not comprehend his teaching; who can use simpler forms of speech, and by some trifling change of words make quite clear to you what before was dark as night; who can see where the links are missing in your chain of thought, and can supply them; and who can thus fit you for the work of self-teaching, which, to those who have learned something, is the most valuable of all.

The two brothers I have described, though agreeing in their earnest and successful work, differ in scientific method. The elder tests "observation" by "authority," and finds it wrong; the younger weighs "statements" against "facts," and finds them wanting. The one regards with all his affection, and seeks for with all his energy, the establishment of the uniformity of Nature's processes; the other as earnestly endeavours in those processes to discover, advance, or progress. What the scientific worker really needs are an appreciation and combination of the two; for in nature they are both present, and we may and do observe them both. Look at individual life, and see that some great processes go on in the same way from hour to hour, from year to year. There is the alternate diastole and systole of heart; the constant play of inspiration and expiration, with their effects on air, and blood and tissue; there is the daily change from sleep to waking, from activity to rest; there is the daily disintegration of tissue, and excretion of waste material, and also the daily assumption and assimilation of fresh supplies. Further, there are recurrences, with wondrous order, of some physical changes—partly those of health, partly those of disease—at still longer, but yet time-ordered periods, and the seasons of this year have effects like to those of the years that have gone before. But with all this order, and as the result of this order, there is progress: the infant grows into the child, the child into the youth, the youth into the man. The changes of dentition and of puberty lead onwards to the full growth of the adult; and then, in its due time, decay comes surely on. Some diseases may appear, go through their well-known phases and observe periods that we can with certainty predict; but they have not been in that individual before, and they will not visit him again: they have done their work. All that he has passed through makes him what he now is; there have been recurrence and order, but also growth that does not return into itself. Yet look further, and see that this growth has its order also: lose the individual in the many, and then see that those things which occur in him but once, which even constitute his separate life, do recur, but recur in others; and so again we see the circle, but a wider one. But is there no progress of this larger group? Look at families, at races, at nations, and you may see that they, too, have their periods of infancy, of youthful follies, of angry passions, of wise discretion, of luxurious ease, of creeping feebleness, and dusty death; and while the one nation, with its one life, sinks away, another takes its place, and the great world is ever young. But the great world also grows, and—

> " I doubt not through the ages one increasing purpose runs,
> And the thoughts of men are widened by the process of the suns."

Look at our sciences from another point of view. See how in that of physiology, in its larger aspects, we observe an onward progress amidst the orderly recurrence of events. Not merely individuals but species become extinct; new species take their empty places, and lower give way to higher forms of life. Whatever may be the theory for its explanation, there can be no doubt about the fact that the life upon the world at this present moment has not the form it had; seeming uniformity of process has wrought out change, and that change is one of progress or advance. We do not exhaust the question of how this is, we only move it a few steps further backwards, if we admit the principle as readily as we see the facts of so-called "natural selection." Go back to the simpler types of life; imagine, if you will, that all the variety that now clothes the world has sprung from one common form; you must admit then that there was in it the possibility of divergence from the type, or, in other words, that it contained within itself the germ of all subsequent developments; and thus, in the only conception we can frame of primeval life, we see in its apparently simpler but really more complex order the mainspring of advance. We observe the same combination if we regard at an early period of its development the now living individual or species. It is easy enough to trace life backwards until we fail to see the differences that lie hidden in some fœtal form, common to all kinds of fowl, to the donkey and the dog, to the monkey and the man. But do not let us suppose that differences, though hidden, do not exist. We may not be able to distinguish the one ovum from the other, and yet the difference between them is so great that one becomes the peacock and the other the Cochin-China hen; the one a Skye terrier and the other a learned Doctor of the Law. It is when brought face to face with facts like these that human science, grateful for what it is, should not trumpet forth generalisations to which it has leaped to conceal its weakness, but should show its real strength in humbling itself before great truths that are as yet past its finding out.

Again, in the yet infant science of geology we may observe the same combination. We argue upon the supposition that the processes of past times were like those of to-day; we believe in the constancy of the operation of Nature's laws. But yet the result of all this is that the world's face has changed, and is changing still; that while the earth lasts although heat and cold, summer and winter, never fail, they never fail to do their work, and that that work does not, so far as we can see, return into itself, but carries out some mighty plan, the mere alphabet of which we have as yet been able to learn.

Notice once more how both order and progress may be seen combined in the history of scientific systems and of philosophic method. Their movement is onward, but it often appears to return into itself; yet it does not thus return. It is not a circle that is described, but rather, as it has been said, a widening and ascending spiral, whose ultimate course we cannot now compute.

Lastly, see how in human life the one kind of law, by its constant and orderly operation, develops results of another and a higher kind. See how the physical forces are often determined in the direction of their action by the chemical constitution of the bodies in which they are displayed; how chemical actions are coördinated to produce results which cannot be expressed by chemistry alone, but require another set of terms, which we denominate the vital; how animal life is determined by mental conditions; how the latter often yield to social and moral obligations; and how marvellously they are all intertwined to produce that complex creation—a living man. How long the apparent conflict of these two elements will last in science we cannot tell. Where is their common point we cannot see; but as the circles of order widen they lose their apparent recurrence, and order and progress become, even in our own minds, one. The infinite circle is identical with the straight line infinitely produced. Our definitions fail, or contradict themselves, when we endeavour to carry them thus far; but we feel confident that there is no contradiction in the things themselves, and our finite minds can feel assured of the existence of some great facts that they have as yet failed to grasp, and may be convinced of the reality of an infinite, abiding, and eternal Truth in which all truths shall centre; in which is no error—no darkness at all, but which can now be only dimly seen or felt after amid the changing and passing shadows of time.

In entering upon our profession, then, you must take high views of its vast demands as a science and of its claims, not only upon your mental, but upon your moral nature. Avoiding carefully the errors I first described, see to it that you have untiring industry, but that your work is deep as well as broad. Strive to learn the inner, often-hidden relations of all branches of your knowledge, but remember that much is yet hidden, and that, therefore, you must approach truth from many sides. And, lastly, in your earnest work to know the laws of life, and in your hereafter daily contact with life—at its beginning, in its troubles, and at its close—do not, in recognising the divinely appointed order of all events, lose sight of that great divine plan of progress which will surely evolve the highest good out of much that now seems deepest evil. You will thus often see a moral purpose in the suffering you try—but try vainly—to assuage; a good in the death you feebly struggle to postpone. Regarding disease as fraught with meaning and purpose other and higher than the mere change of organ you can see and handle and record in your pathological note-book; looking on death as the fulfilling of some greater end than can be represented in the Registrar-General's returns; though often saddened, often baffled in your unequal conflict with these two great foes, you may see that they also have a work to do, perhaps more friendly than your own; and thus you will be led to feel, and that with a conviction no other profession could urge so strongly upon you, that though

"Suffering is permanent, obscure, and dark,
And has the nature of Infinity,
Yet through that darkness (infinite though it seem
And irremovable) gracious openings lie,
By which the soul—with patient steps of thought,
Now toiling, wafted now on wings of prayer—
May pass in hope, and though from mortal bonds
Yet undelivered, rise with sure ascent
Even to the fountain-head of peace divine."

THE DEFINITION AND NOMENCLATURE OF DISEASE:

Being the Introduction to "A System of Medicine."[1]

DEFINITIONS OF DISEASE; AND NAMES OF DISEASE.—The attempt to define "disease" must be a failure until we are possessed of a satisfactory definition of "health;" and we are not likely to arrive at this possession until we are able to define the idea that we entertain of the still more fundamental fact of "life." Yet some attempt at definition is not only important, but even essential, for the work set before us in these volumes; inasmuch as the general ideas entertained about disease vary as the years pass on, and the position of medicine in the system of the sciences is not only expressed by the approximate definition that we frame of disease, but is actually determined by the principle or idea which such definition is constructed to convey.

If we regard disease in the abstract, to have to deal with that which changes, fetters, renders painful, shortens, or puts an end to life; and, from this point of view, disease may be defined to be any condition of the organism which limits life in either its powers, enjoyment or duration. We need not stop to discuss the many futile essays that have been made to define that which transcends definition, but which we all, more or less accurately, understand by life. We accept it as a fact, of which we all know much, but of which we are all assured, by what we do know, that there is much more that we do not know; for it goes beyond our observation, not only at its beginning and at its end, but in its middle term, when it is the most—but even then only partially—exposed to both our senses and our consciousness.

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[1] This introduction to *A System of Medicine* is a complete essay in itself. It is reproduced here by the kind permission of Messrs. Macmillan and Co., Ltd., the publishers of the work.

Disease is a condition of the individual man; it is always something more than the changes that we yet can recognise and describe in any particular organ or its function. It is the man who is ill; and, under all circumstances of illness, he has a diminished life. Some organs may be overactive; but their excess of work is needed either because work elsewhere has been left undone, or because it has been done so roughly that parts of organs have been killed before their time, and their wasted materials have to be changed and got rid of with all haste; or because that which held their activity in check has been damaged or destroyed. At all times such overwork is fatiguing and hazardous; often it is directly dangerous, and sometimes it is destructive. Disease is that which limits life—in its usefulness, enjoyments, or duration; and although the body is so constructed that it can often regain its balance when the disturbance has been slight, yet disease, under all circumstances and to all degrees is the lowering of life, and, even in its most trivial forms, is the "shadow of death."

This mode of regarding disease furnishes us with the *measure* of its importance. A man is ill, or diseased, in degree exactly corresponding with this limitation of his life. A morbid idea may make life miserable and useless; a fatty tumour may be an unfelt excrescence. Many lives are spoiled by diseases that the anatomist cannot name; many lives are but little altered by growths or lesions which may be weighed and demonstrated before a crowd.

If we consider disease from another point, and deal with it as a fact of daily experience, we come to regard it as any departure from the structure or functions of the body as these are shown to us in health; and thus we may define it to be an abnormal condition of function, or structure, or both.

But if we contemplate disease in its relation to the many names by which its various forms are recognised, we have a complicated problem with which to deal, and can only solve it by endeavouring to separate that which is common to all phases of ill-health, from that which is peculiar to the various names by which those phases may be known, but by which they are only imperfectly expressed. And in order to do this we must recall some typical examples of these names. A patient may be described as suffering from, or he may be said to be an example of, the disease called inflammation of the lung, hooping-cough, tuberculosis, anæmia, typhoid fever, hysteria, or of some other malady, which would or would not readily fall into one or the other of these categories. And be it observed that by this term, "inflammation of the lung," is expressed a particular kind of change in one organ of the body; by "hooping-cough" is meant a special and characteristic variety of a symptom common to many very different affections; by "tuberculosis" is intended some general change in the whole body, distinguished from other general changes by its association with the appearance in one, two, or many organs of a particular material known as tubercle; by "anæmia" is understood literally only an absence or deficiency of blood, but generally an alteration of quality rather than of quantity; by "typhoid fever" is conveyed the idea of a change, of a particular type, in the whole organism, and one which is produced by the introduction into the body of a poison from without; while by "hysteria" and similar phrases, is conveyed some meaning or none at all, and when the former, a meaning as various in character as are the individuals who use the word. There are other principles upon which disease has been named, and by which it is now described, but these examples are sufficient to show by their very existence the varying prevalence at different periods of diverse theories about disease; about the relation of the one organ to the whole system of organs; the nature of the changes which different organs may undergo; the value of particular functional alterations, and of special symptoms; the relation of the blood to life, and to the tissues of the body; the lien between certain materials we can see, and some general conditions we can appreciate by their effect on life; the position in which life functions stand to the various poisonous agencies around them, and within them; and the concealment, by patent facts of little moment, of important conditions which may be inferred to be their cause. Thus the history of a science might be shown to be written in the names by which the objects about which it is concerned have been described and recognised: but such is not the end now in view; it is to show that the principles upon which diseases have been named have varied widely, not only at different periods, but at the same; and that so great is the diversity among them, and so strangely aberrant are the forms which disease sometimes assumes, that, hitherto, no self-consistent and at the same time practical nosology has been devised. English physicians have therefore thought it better to retain old names that were well understood, although based upon doubtful, if not erroneous pathology, rather than to invent new terms which could not possess the advantages of their predecessors, although they might very probably share their faults. We have therefore gradually accepted a nosology of most complex composition with the tacit or expressed admission on all hands, that by "pneumonia" is intended much beyond the particular condition of the lung; that it implies changes antecedent to itself in the general nutrition of the body, and alterations in all the tissues and in their processes when the disease itself appears; that the words "hooping-cough" convey more than is included in a particular variety of cough which is characterised by a hooping sound, viz., the well known history and social relationships of a disease altogether distinct from the paroxysmal cough and hooping-sounds not rarely met with in cases of chronic bronchitis and emphysema; that by "tuberculosis" is intended a condition as well marked by general as by local changes, and probably dependent upon some constitutional vice which determines, and is not determined by, the special form of local change; that by "anæmia" is meant much more than the mere etymology of the word can convey; that by "typhoid fever" is intended the description of a disease having relationships only very inadequately expressed by the words in common usage to denote it; and that by "hysteria" and similar expressions are understood more than the present state of medical science will explain, and much more than the words themselves accurately define.

In this state of medical nomenclature, and of medical science as represented by the names it sanctions, it is difficult to arrive at any other *definition* of disease, than that it is the sum-total of morbid changes in both function and structure; and we must further admit that the *names* by which diseases are recognised are somewhat arbitrary terms used for the purpose of recognition without any constant value as to the meaning of those words in a system of pathology. Sometimes the name expresses what is believed to be the essential or most important fact; sometimes the first link in a long chain of causes and effects; sometimes a characteristic symptom or group of symptoms; sometimes an idea as to the mode of origin of the disease; and sometimes such a negation of all theory, as contents itself with words which shall be understood to mean certain things to which they bear no more pathological relation, although they may have more seeming scientific value, than the common algebraical expressions for "unknown quantities," x, y, z.

But there is underlying all our nosology, an idea of something special or individual in the diseases that we name. This notion is distinctly expressed with regard to some hinted at in relation to others, and unsuccessfully concealed in respect of the rest. In spite of opinions to the contrary the physician knows that there is, in his mind, an ideal type of disease, which he cannot define, and cannot find realised in actual practice, but yet to which type he refers the examples that come before him. Disease to him is something more than a group of symptoms, it is that which makes the group; and he is—as indeed he ought to be—like the naturalist in his process of nomenclature, striving to express, by the names he uses, that which occasions the inner relation between essential facts, and not merely that which will denote the outer and often quite superficial assemblage of phenomena.

As, however, the idea above alluded to is very different in different minds, and pathology is, as yet, in such a condition that it cannot furnish a complete scheme of nosology, based upon the attempt to express, by name, the fundamental facts of all the many maladies with which we are acquainted, disease is defined to be the sum-total of changes from a condition of health which may be recognised in either function, or structure, or both; and the names of diseases are held to be merely convenient expressions for their recognition.

STRUCTURAL AND FUNCTIONAL DISEASE.—In describing the elements of what we call disease, two terms have been frequently used, "structure" and "function;" and we know that the two phrases "structural disease" and "functional disease" have passed into common usage. Recently it has become somewhat the fashion to object to the latter, and to deny the existence of any such condition. It is necessary therefore to state the grounds upon which the phrase "functional disease" has been retained in this "System of Medicine," and the precise sense in which it is employed.

For this purpose three classes of facts have to be remembered. First: that there are some structural alterations, such for example as atheroma in the vessels, which may, if an individual has been killed by an accident, be found extensively distributed throughout the body, the existence of which had neither been known nor suspected by the presentation of any functional change, or symptom, during life. On the other hand, a man may have suffered for many years from discomfort, or marked derangement of the functions of the brain, heart, or lungs, and yet the most practised anatomist, with all means and appliances to help him, may fail to discover, *post mortem*, any organic change which is sufficient to have accounted for them. Second: another class of facts, constantly lost sight of by those who deny the existence of functional disease, is to be found in the relations between structure and function in health. At the end of a day's work, and after a night's repose, we might find the two extreme conditions of the organism as regards function. For twelve hours every muscle, nerve, and organ has been doing its utmost, and as we know has been wearing out: during the hours of sleep, many organs have been doing little, and some nothing, whereas others have, as it seems, to work on without repose; but in all repair has been going on. By an examination of the body, killed suddenly at the end of one or the other of these periods, it might be possible to infer which had been the condition immediately preceding death. But this inference would be based upon the relation exhibited between the *products* of functional activity such as the nature, quantity, and quality of the secretions in their several receptacles; and the *raw materials* upon which the organs have to work, such as the nature, quantity, and quality of the chyle, lymph, and blood. It would not be formed upon regard directed only to the condition of organs which had been either in activity or repose. It could not be so based, because the process of repair in the living, healthy body is one that is simultaneous and commensurate with waste. The muscles are not mended up as we mend a damaged wall, by patching up a hole here, and binding on an iron brace or girder yonder; but the process is interstitial; new material is brought in, and brought everywhere; the existing organ is worn down, and the waste matter is carried away; but with all this change there is a persistent textural result. Looking at this question still more closely, we see that function is related to structure, not only in the sense that it is what the organ does, but in the much more important meaning that it is at once the expression of the wear and also of the repair of the tissues; or in other words the outcome of their life. In the present state of physiology, it is impossible to conceive of a living organ without believing in the nutritive, molecular changes it is undergoing; and these are the essential conditions of its functional activity: it is equally impossible to imagine the function of any living tissue being called into exercise without recognising the dependence of this functional operation upon interstitial movements of waste and repair. But we should be wrong on the other side were we to confound function with the nutritive changes which constitute, not the function itself, but the conditions of its exercise. It is, for example, the peculiar function of a muscle to shorten itself, of a nerve to convey an impulse either of motion or sensation, and of a nerve-centre to convert one of these impulses into the other; the organs referred to, in the exercise of these functions, undergo certain nutrition-changes; but those molecular changes are not the functions of the organs, but the conditions essential for their performance. This principle, which it seems almost unnecessary to state, in regard of the particular organs or tissues now referred to, is, however, not infrequently lost sight of in respect of secreting organs. It is the function of the salivary gland to secrete a fluid having special characters; of the liver to do this, and to effect certain changes in the blood which comes to it; and so of other secreting organs: they receive blood into them, and from all of them it passes away changed; and the organ, as part product of this change, gives up its secreted matter. These functions, be it observed, depend for their performance upon nutrition-changes in the cells and tissues of the organs; but those fine processes of change are the conditions of functional activity, and are not to be confounded with the thing itself. The secreting cell has to live, to waste, and be repaired; and it lives at a degree of pressure, and is wasted and repaired at a rate directly proportioned to the amount of work that it accomplishes; and thus it is conditioned precisely as are the ultimate elements of the muscle or the nerve. But minute as is our knowledge of much that goes on in the secreting organs, and of the chemical nature of the results or products of their work, we know no more of the physical conditions which determine that one set of cells shall separate urea, another set saliva, and a third bile acids from the blood, than we do of those which enable one nerve-fibre to convey impressions of light, another of sound, and another those of motion. These are, at present, ultimate facts of physiological science; the function is the expression of the life of the structure; it is what the latter was constructed for the purpose of doing; in doing it the structure undergoes change; it is wasted and repaired, but these processes are carried on without any breach in the integrity of tissue. Function is to nutrition as electricity is to the chemic changes in the galvanic battery, a "correlated force." We do not say that the one is the other, but that it is converted into it; and as in the inorganic world the arrangement and nature of the particular materials with which different forces come into contact, determine whether chemic action shall appear as heat or magnetism, whether heat shall be shown in motion, light, or electricity, so do the different materials of the living organs and their arrangement determine the nature of the functions they perform. How they do this we do not know; but the facts of physiological science are well known—viz., that the nerve cell exhibits one class of powers, the muscular cell another class, and the secreting organs a third. Third: a third class of facts to be remembered is, that in many diseases the only symptoms to be recognised are changes in the degree of activity with which certain organs perform their functions. No new element is introduced by some diseases into the category of vital actions; such affections as chorea, hysteria, epilepsy, might be shown to consist of mere modifications in the degree, time of occurrence, and combinations of functions, each of which, taken *per se*, is consistent with health. The sudden loss of consciousness in epilepsy, for example, is not more mysterious than is the sudden but every-day recurring passage from wakefulness to sleep; the arrested respiration is similar in kind to that seen when the chest is fixed in the performance of any great muscular exertion involving the upper limbs; and still more similar to that which can scarcely be called morbid, the prolonged apnœa of a screaming child, whether the scream be the expression of terror, temper, or pain. The convulsive movements are neither more nor less than nerve and muscular functions, any of which might separately, and many of which might in combination, be the expression of healthy, vital activity.

From these three classes of facts, therefore, we are compelled to admit that, in the present state of science, the *onus probandi* lies with those who assert the constant presence of structural in association with functional change; and we affirm that those who make the assertion have never proved their point. Further, that as a matter of inference from what we know of the relation subsisting between structure and function in health, we should not even expect to find solutions of continuity or coarse changes of texture in those diseases the essential elements of which are functions altered, not in kind, but only in degree and mode of association; and that, on the other hand, when we do find material changes in association with functional disturbances, we should refer many of the latter only indirectly to what we see of the former, the more numerous and more important of them being dependent upon what we do not see—viz., the finer changes in the interstitial processes of nutrition. A scirrhous tumour of the stomach, for example, may produce certain symptoms easily explicable by its mechanical effects; it may be so situated as to prevent the ingress or egress of food; but vomiting may occur when the orifices are free, or when the tumour is situated in some organ in the pelvis; the supposed tumour may cut off the supply of food, and so explain some of the changes we see in colour and general nutrition; but on the other hand the extreme of wasting and of cancerous tinting may be seen when there is no such enforced abstinence from food, but when indeed a large quantity is not only taken, but is digested and enjoyed. So again a clot of blood in the corpus striatum may sever the nerve-fibres, and so explain the severance between the will and certain muscles of the extremities; but it will not so explain the presence of convulsions, or of spasms in those palsied limbs.

For these reasons we retain the words "functional disease;" understanding by them such changes as have no recognised morbid anatomy, but such as depend upon corresponding changes in the finer processes of nutrition. We do not believe that there is any altered function without a correlated change in the nutrition of the organ; but what we assert is that such change, as a matter of fact, is of such kind as to be undiscoverable by our senses, and as a matter of inference, from what we know of the relation between nutrition and function, is of such nature that it may always be beyond the reach of observation. No healthy function is performed without nutrition-change; no morbid function can exist without altered nutrition-change; but the relations between the two elements, " structure " and " function," is the same in the two conditions.

Nothing is more erroneous than the common notion that " functional " means trivial, and that " structural " means severe. Many diseases, designated by the former word, are long-continued, obstinate, or destructive ; many known by the latter are of short duration, are amenable to treatment, or are harmless. Diseases which spoil or shorten life are not trivial because they depend upon such fine changes as may escape our observation ; but they are the more serious when they thus elude our notice, just because they have their place in the very centre—the most ultimate process and fact—of life, the conduct of nutrition.

NATURAL HISTORY OF DISEASE.—Under this phrase are recorded the symptoms or phenomena of disease, their causes, the manner of their development, their duration, and the different modes of their termination, whether the termination be in death, or in a return to health. In the natural history of disease no theory is involved ; we have only to deal with facts.

Causes.—Commencing with that which precedes the appearance of symptoms, viz., the " causes " of disease, there are some principles which it is important to lay down ; inasmuch as our ideas of the causation of disease are determined, in great measure, by our conception of what disease itself is. Nothing is more easy sometimes than the discovery of a cause, and its distinct separation from a particular and well-known malady. For example, a healthy child is brought into a room where some one is suffering from scarlet-fever, and after a certain period it exhibits symptoms of the same malady, and passes through all its stages. Here we say there was direct communication of the malady ; but we must not forget two facts, first, that some children so exposed do not take the fever, although they have not previously had the disease ; and secondly, that those who have suffered from it once rarely take it again, although they may be exposed to infection. We suppose a constitutional disposition in one case, an indisposition in a second, and assert the existence of the latter in a third. Still, when the cause has operated we feel that we tread on safe ground when asserting broadly that the cause is infection.

Nothing, however, is more difficult in some cases than to say what the cause of a disease has been. For example, six people take an indigestible meal, and one of them suffers nothing, a second is troubled with dyspepsia, a third with asthma, a fourth has an epileptic fit, a fifth an attack of gout, and a sixth is disturbed with diarrhœa. One element in the causation of all these maladies is the same, viz., an indigestible meal, but the results vary widely ; and we say that this is owing to constitutional conditions which "predispose" to these particular affections. These have been called "predisposing causes"; but we must inquire what they are, and how they are related to these diseases, if we would understand the latter. Among the predisposing causes are reckoned hereditary taint, sex, age, and constitutional peculiarities, either congenital or acquired ; and with regard to two of these, hereditary taint and constitutional peculiarity, we must admit that they are, in reality, disease. When we allow the existence of either, we but throw back a few steps further the line and widen the circle which includes all that we mean by the disease itself ; we include in the malady more than its name expresses ; we partially account for its occurrence, but do not explain its "cause." It is quite true that we may sometimes draw a line between certain so-called causes and effects—we may say, for example, this man, of tuberculous family and with latent tubercle, was yesterday apparently well, but he was exposed to cold, and to-day he has tubercular pneumonia ; his constitutional state "predisposed" him to the evil, which the exposure "excited" into activity ; but regarding him from a pathological point of view in his present position, that of a sufferer from tubercular pneumonia, we cannot separate the elements of his disease so easily, for it was not a cause of his malady which was there before, but an integral part of the affection under which he is now labouring. A similar difficulty is to be encountered on almost every hand ; the worry of the Stock Exchange is borne by some men bravely, others succumb, but variously, one goes mad, another is broken down, a third becomes epileptic, and so on; and we fly to the resource of "predisposition," some weakness somewhere, which this wear and tear has pointed out and urged into morbid activity; but in that very weakness, if there was not the whole of the disease called A, B or C, there was some important element of it, and not its remote or "predisposing" cause. If disease be, as we believe it must be, defined to be the sum-total of changes in either structure or function, or both, then almost all of these so-called "predisposing causes" are part of the disease itself.

But those other conditions, sex and age, it may be asked, are they integral elements of disease, or are they its cause? Sex cannot be said, accurately, to be a cause of disease any more than the same can be affirmed of life, but yet, in all modern treatises on medicine, it figures in the chapter on ætiology. Be it observed, however, that the word "sex" when thus used, has reference to many conditions of difference beyond those which consist in the reproductive organs. The male sex, as a rule, exhibits the masculine frame of body and of mind, while the female sex displays the opposite; and their respective "predispositions" to disease have relation to these characters as well as to the physical structure of the apparatus of reproduction. The existence of an organ is the necessary condition of its becoming diseased,—a man cannot suffer from ovarian tumour, nor a woman from orchitis,—but there are some organs common to the two sexes and equally developed in each until the sexual distinctions of puberty are seen; then in the one they become rudimentary and inactive, whereas in the other they take on new and important functions. In these instances sex may be said to be a predisposing condition of disease, but it is only so in this sense, that it exposes certain organs to some of the causes of disease by the simple fact of their functional activity. It must not be supposed that the healthy action of any organ predisposes it to morbid change; on the contrary, it exerts rather a strengthening and protective influence; but such activity simply lays it open to the operation of influences which cannot be brought to bear on its counterpart which remains in a rudimentary condition in the other sex. But besides these essential differences there are others which are accidental, and which depend upon education, practice, and habits of life, as these are determined by the customs, fashions, or peculiarities of the people and their times. And, further, there are many facts with regard to the relative proclivity of the sexes to special diseases which have not yet been explained by any known relation of these maladies to the reproductive organs. Simple ulcer of the stomach and carcinoma of the same organ afford examples of this difference of proclivity, and we at present have to regard them as ultimate facts of Pathology.

Among the conditions which determine, therefore, the differences of sexual predisposition to disease, we reckon (1) the actual presence or absence of the organs; (2) the action or almost absolute inaction of the organs; (3) the relation between the amount of activity of some functions of certain systems of organs, and other functions of the same systems, where differences exist *ab initio;* and (4) the effects of habit, education, and fashion in either producing or lessening functional activity, with all its correlated structural conditions.

In a similar manner must we regard the influence of age in the production of disease. It is not, *per se*, a predisposing cause, but it carries with it certain things which may be. If we can conceive of a perfectly healthy organism placed in absolutely healthy conditions, then we may believe that it would pass through the stages of growth, dentition, puberty, adult life, and decline; and that it would perform all the functions of self-preservation and reproduction without either hurt or hindrance; sometimes, nay, very often, we do actually see some of these stages passed through with as entire a freedom from discomfort as any ideal being placed in the most Utopian circumstances could wish for; but at some point or another in the long course of life, the chain of good succession is broken by a faulty link or an unexpectedly heavy blow, and then follows one or another of the many ills that make up the miseries of common life, and average health. On the other hand we see cases in which nothing seems to be capable of going well: every epoch, every change, every organ, seems, as it were, pounced upon at every turn by all the evil agencies that surround it; action or inaction, growth or decay—it matters not which—seems exaggerated into a condition of disease, and life is a lifelong misery. It is clear that no one period of life is in itself a cause of disease, or of exemption from its occurrence, since all periods may be passed through without any disturbance of the health, and no period possesses absolute immunity from its attack. But it is also evident that the changes which take place at certain periods render some individuals liable to the operation of other causes, and that this operation may be very effectual in the production of disease. Such periods are those of rapid structural development, and the commencement of new functional activities, or the decline of structure and the arrest of action. That which would seem to be the condition tending to morbid development is the disturbance of the balance of activity and growth between different organs, or systems of organs, so that for a time at least an undue preponderance is given to a certain set. Thus, during the first dentition, although there is general growth, there is particular activity of certain organs; and, in like manner, at the commencement of puberty, there is, as it were, undue prominence given to the organs effecting reproduction; and although the particular structures involved in these developmental changes may not be selected as the localities for morbid action, the very fact of their disproportionate activity—by disturbing the balance of general nutritive progression—may become a cause of derangement in other systems of organs, such as the vascular or nervous. In like manner, at the climacteric period, the repression of certain functions to the operation of which the whole body has become habituated through a long series of years, may prove itself the starting-point of morbid changes in the functions of other organs which are, by this repression, placed in new and trying circumstances. By these considerations we may, for the most part, explain the influence, where it is marked to the highest degree, of age as a so-called predisposing cause of disease.

But there are some maladies which appear to have a definite relation to age, and which are not explicable upon these principles; and with regard to these we must admit that certain periods of life are associated with proclivity to disturbances of particular kinds, the nature of the relation between the two classes of conditions being at present unrecognised by medical science. At the same time, the history of all science is such that it teaches us to believe that these relations will be hereafter discovered and found to be analogous to those which we already understand and appreciate.

The term "exciting cause" of disease has been applied to another class of condition altogether, and one with regard to which there is much less difficulty. That which is involved in the term is the operation of some influence from without, be that such as to act upon mind, emotion, sensation, nutrition, vascular conditions, or any other functions or property of the living body. A great surprise, or an overwork, may affect the mind; and a domestic calamity or the worry of business may disturb the emotional centres; a physical injury may set up changes in sensation; a forced rest may weaken muscular nutrition; a slight bandage or an altered position may influence the vascular supply; cold or heat may diminish or increase the temperature of parts; and in like manner other agencies may affect the organism, and become the exciting causes of disease. The form which the latter take is determined partly by the nature of the exciting cause and its relation to this or that system of organs; and partly by the condition of the organism; in regard of a hereditarily received or congenitally acquired morbid state, the peculiarities of sex, and the period of life.

Two things therefore concur to make up what we term the causes of disease, but they are essentially distinct, and it would be better to denote them by different names, than by one name differently qualified. The one, the so-called "predisposing cause," is a "diseased condition," and is therefore a part of the disease itself; the other has no necessary relation to the individual or his constitution, and is in reality a "cause" of the disease from which he is suffering.

SYMPTOMS OF DISEASE.—The meaning which now we must assign to the word "symptom" or "sign" of disease is very different from that which some time ago would be conveyed by those terms. So long as disease was regarded as something put into, added to, or engrafted upon the body; a material, or other entity,—having even a more or less substantive existence,—these words described the means by which we might recognise the presence of such an entity: but so soon as disease is recognised to be, as we have defined it, the sum of changes in function and structure presented by the living being, the words "symptom" and "sign" have another meaning, and describe only those parts of the disease which are appreciable by others. Disease is a complex state of a complicated organism, and, although the *name* which we may give it may be intended to express its primary or most important fact, we cannot separate this one fact from others with which it is associated, but must regard them as integral parts of the malady we have either to study or to treat. They may differ, from an outside point of view, in proximity of relationship; but the heat of the skin, the altered pulse-respiration ratio, the nature of the expectoration, the changes in the secretions, in the nervous system, and in the prospects of life, together with the altered resonance, breath and voice-sounds, are as much parts of the disease called "pneumonia" as are the structural conditions of the lung. Some of them may be signs by which we recognise its presence; but they are also essential elements of the malady itself. In like manner it might be shown with regard to those other diseases, the nomenclature of which differs as we have already described, that a precisely similar relation exists between what we have denominated "symptoms" and what we understand by "disease." We cannot know of the existence, during life, of any disease except by its symptoms; we cannot conceive of disease apart from some recognisable changes in either function or structure; and these changes constitute the disease; nor can we, on the other hand, imagine the existence of what we call "symptoms" apart from the correlative idea of what we conceive to be "disease." The two classes of notion have been, of necessity, distinct in their development; but the maintenance of the distinction between them has been a hindrance to true progress in pathology; and it will be well for us to try and remove that hindrance. So long as "disease" is thought of as something—it matters not what—distinct from the "phenomena" or "symptoms," by which it makes itself known, so long are we in danger of mistaking its real meaning, and of overlooking those true guides towards the removal or alleviation of its evil, an end to which all medical science ultimately points.

"Disease," we have said, is a change of structure, or of function, or of both; "symptoms" are those changes in structure, or function, or both, which we can recognise. The latter—the symptoms—are not separate from, but are parts of the disease, and their only characteristic is that they are such parts as are appreciable during life. But they differ in kind and in value among themselves, and have been known by different names, so that we meet with such distinctions as those between "signs" and "symptoms," between "objective" and "subjective" symptoms; and between "general" and "local" symptoms. These terms almost explain themselves, and are retained because they possess a certain amount of utility; but it is more easy to make use of them in practice than to define their exact meaning in the abstract. The idea underlying the word "sign" is that it is some physical change which can be observed directly; and thus we speak of dulness on percussion, tubular breathing, augmented vocal fremitus, and bronchophony as "physical signs" of condensation of the lung; whereas we speak of dyspnœa, expectoration, and fever as "symptoms" of pneumonia or tuberculosis. But heat of skin, an eruption on its surface, the wasting of a muscle, or the fact and quality of a secretion, are as much "physical signs" of a disease as are the particular phenomena we have mentioned. Yet it is almost unknown, it is certainly very unusual, to hear the term "physical sign" applied to any of them. It is easy to trace the origin of this distinction between symptoms and signs to the period when the physical examination of the chest arrived at its due position. It was felt that an amount of precision in diagnosis was arrived at by percussion and auscultation, such as never was dreamed of in the times before such modes of exploration were employed; and therefore the conditions revealed by their aid were expressed in terms differing from those which had been previously employed to describe such changes as short-breathing, pain, expectoration, and the like. But it is impossible to maintain the distinction; the number of respirations per minute is as much a "sign" as is the dulness on percussion, and both of them may be "symptoms" of disease. Everything that may be observed is both the one and the other, and the reason why the distinction has been maintained is because with regard to the former—the "sign"—there may be but one means for its recognition, namely, observation from without; whereas with regard to the latter—the "symptom"—there is a possibility of confounding two things essentially distinct, namely the sensations of the patient, and the phenomena he presents. Deficiency of resonance is discovered only by percussion, but short-breathing is a sensation of which the patient complains, as well as a phenomenon which may be appreciated and measured by the physician, and in like manner wasting of a limb may make itself at once evident to the observer, whereas paralysis is a condition which the patient may assume.

The really valuable element of distinction between these two classes of phenomena is therefore that which exists between "objective" and "subjective" symptoms; meaning by the former word all those elements of disease which can be appreciated by the senses of the observer, and by the latter those which can only be known through the statement of the patient. Whatever of disease comes to us through the mind or feelings of the patient, as expressed by language, either of gesture or words, is a "subjective" symptom. Its form and its degree of intensity are subjected to the conditions of the machinery—mental, emotional, and sensational—through which it passes, and it is liable therefore to be changed, either in character or degree. Whatever of disease comes to us through our own senses alone escapes the danger of addition, alteration, or subtraction, and is *pro tanto* of higher value. In one class the patient gives his version of his case; the symptoms are such as we can only get at through his mind, and they are termed "subjective": in the other we make our own observations—the feelings or ideas of the sufferer have nothing to do with them—simply physical facts are the objects we recognise, and such symptoms are called "objective."

As a general rule the objective are much more valuable than the subjective symptoms; but let it be remembered that the importance of the latter is very widely variable, and that sometimes it may far exceed anything that can be derived from direct observation. In the early stages of some serious diseases of the heart, or brain, nothing may be presented to the practised ear or eye; yet the patient tells us of a deep unrest, or sudden horror, which, although it has no objective sign, may be the herald of a sudden or lingering disease as true and as important—although to others the mind seems clear and the heart's beat healthy—as any murmur we might hear with the stethoscope, or any palsy we might measure with the hand. We have to deal with man as a whole; and to ignore or undervalue what he tells us of his ideas, emotions, or sensations, because they may be termed "subjective" symptoms, and be held to be therefore unreliable, would be to shut out from ourselves that which—egotistic and fearful, prejudiced and ignorant as man may be—yet forms an integral part of his life, and therefore of his disease. We must be careful to give to both groups of symptoms their true value, and our danger in the present day is to underrate the importance of those which, a few years ago, constituted almost the total symptomatology of disease.

The distinction between "general" and "local" symptoms need not detain us, since the terms are obvious in their meaning, and the difference between them is gradually dying out by the recognition of the fact that no one organ can have its functions or its structure changed without the existence of some relative change in all the rest.

COURSE.—In describing some few diseases we have little more to do than to detail the phenomena present at any one given time; whereas in furnishing the natural history of others we are compelled to speak of premonitory symptoms, or prodromata, of the modes of commencement of the illnesses, their forms of attack or their *début*, and of the different stages—two, three, or more—through which they pass. Between these two extremes we have every amount of variation: the natural history of one disease may be compressed into a sentence, that of another may expand into a book; but more commonly we have to deal with histories intermediate in duration, and perhaps less emphatic in their interest.

It often happens, however, that the mode in which one event follows another is of great importance in the diagnosis of disease. For example, the decumbency in pleurisy has different meanings at the commencement of the malady and at its later stages; and in like manner rigid muscles teach one thing at the onset of a paralytic seizure, another when the immediate effects are passing off and the patient is regaining power; and still a third when without such restoration it makes its appearance at a yet later period, and in a well-known order.

Not merely the mode of sequence, but the actual time of sequence is of diagnostic and therapeutic value; and this we know full well in the study and recognition of the acute specific diseases, of malarial fevers and the like; and with equal significance, though with less accuracy of measurement, can we use the element of time in the diagnosis of many chronic diseases; and such element may sometimes be sufficient to determine a question left wholly in the dark by other elements which we have had before us. In this manner time enters occasionally into the diagnosis of tubercle, of cancer, of hæmorrhage, and of other maladies; and it would be difficult to overrate its value in those special cases which are left in obscurity by the absence of special or pathognomonic symptoms.

Again, the relative intensity of symptoms is a point to which attention must be frequently directed, for by this alone a diagnosis may be possible. If we regarded the relative intensity of pain, dyspnœa, fever, cough, and general nutrition-change, each of which might be present in bronchitis, pneumonia, pleurisy, phthisis, or asthma, it might be possible to say which disease existed, and this without the aid of auscultation or percussion. And in like manner by regarding the relative amount of coma, paralysis, spasm, and rigidity it would be possible to distinguish, in some cases, between cerebral hæmorrhage, acute softening of the brain, congestion of the brain, or urinæmia.

All these particulars have to be described under the head course of symptoms; and they form an essential part of the natural history of disease.

DURATION.—The importance of a consideration of time in the diagnosis of some classes of disease has already been referred to; it is of no less importance when, diagnosis being determined, a knowledge of the natural history of disease gives us power to foretell, with some approximation to accuracy, its probable results.

We know approximately the duration of herpes zoster, of vaccine, or variolous pustules, of typhus, or scarlet fever; and we know also approximately the duration of phthisis pulmonalis, of carcinoma ventriculi, and of other maladies. With regard to the latter—the chronic class—our knowledge is much less definite, or rather it lies within a larger range and is of less practical utility. It may, regarded from a pathological point of view, be even more accurate than that which we boast of in respect of the acute diseases; for the relative range of variation is not greater, although in the one case we deal with days or even hours, and in the other with months or years. But life is on one side of the balance and death is on the other, and the balance is struck between those two, whether the beams be long or short; and so we congratulate ourselves upon a readily used and readily appreciated forecasting of the immediate, present evil, and perhaps underrate our sounder knowledge with regard to that which may not happen for ten, twenty, or a hundred months.

The duration of symptoms, therefore, though of variable social value, is of vast interest in the natural history of disease.

TERMINATION.—A disease may end in various ways:—(1) The patient may gradually get rid of it altogether. (2) He may lose all the urgent symptoms—all that at one time seemed to constitute the malady—and yet retain some less urgent symptoms; or some which are not recognised at all; or some which—so far as the patient's own feelings are concerned—are not, even after recovery, recognisable, but which may be discovered by a physical examination of the organs instituted by the physician. (3) He may continue to present all the local disturbances, while the general or constitutional changes pass away, and thus the disease persists, but in an altered and what is called a "chronic" form. (4) The disease may become worse, pass from one stage of weakness to another, and end by the destruction of the patient, which may be brought about in various ways. Now, all these points in the natural history of disease are of much interest in regard of prognosis, and of treatment. The recognition of early signs of recovery is a great help towards the choice between therapeutic means, and is a good ground for employing one of the strongest of these means of cure, viz., hope. The search for and discovery of the effects of an acute illness—although in that acute form it has passed away—are of great importance to the life, prospects, work, and career of the unconscious sufferer. We must know these probable consequences if we would perform our duties as the advisers of those who place themselves under our care. It is not enough to guide the disease to an apparently successful issue; we must know what weak point it may have left behind, and we must guard this with the utmost caution. Again, the tendency to pass into a chronic form often reveals the existence of some constitutional vice we had not before suspected, and thus renders itself available for a more effective direction of our therapeutic agencies. And, lastly, the perception of the early indications of a fatal issue may be of great social or individual value; whereas the recognition of the mode in which death threatens to approach may be the means of teaching us to select such measures as shall temporarily, or even indefinitely, postpone the evil. Thus the terminations of disease, whether they be in health, in impaired health, or in death, are not only full of interest to the natural historian and the pathologist, but are full of teaching to him whose aim is to render natural history and pathology subservient to the great work of healing diseases, or relieving them, or of measuring their duration and lessening the pain with which they do their work.

DIAGNOSIS OF DISEASE.—In the earlier days of medical science, the problem of diagnosis might have been stated thus:—"given the symptoms, to find the disease"; but, in these days, such problem must be translated into the following terms "given some of the elements of disease, to discover the others." We do not now regard eruptions on the skin, peculiar changes in the mucous membrane of the throat, an elevated temperature, and a disturbed innervation as the signs by which some morbid entity in the body reveals its presence; but as parts of the morbid condition of the organism, from which we may infer the existence of simultaneous changes in stomach, intestines, liver, spleen, or kidneys. The rose rash of typhoid is as much a part of the disease as is the ulceration of Peyer's glands; the dulness on percussion, the altered condition of the urine, the changed nervous power, are as truly elements of the disease called pneumonia as are the minute alterations which constitute inflammation of the lung. Some of the elements of disease escape our observation during life; some are directly perceived by us, and others are appreciated indirectly by such processes as percussion, chemical examination, laryngoscopy, spirometry, and the like: but the only difference between these is their relation to the observer; they occupy precisely the same position in regard to the disease itself. The process of diagnosis therefore is the passage, not from effects to causes, not from phenomena to noumena, for, strictly speaking, we do not at all know what are either the causes or the noumena of disease; but diagnosis is the process by which, perceiving some particulars, we infer the existence of others which we know to be commonly associated with them. This is, however, the pathologic or scientific side of diagnosis and the question may still be asked, What is it practically? Practically, diagnosis is the process by which to a certain set of symptoms we affix a more or less familiar name; and become able to say that such an one is suffering from typhoid fever, meningitis, whooping-cough, epilepsy, or gout. And when we have given some names to diseases, we have, more or less intentionally, and with differing degrees of accuracy, conveyed some theory into the process of diagnosis. Remembering what was said with regard to "names of disease," we shall find that, in this practical sense, diagnosis is sometimes the discovery of and the calling of a disease by what we conceive to be the most important structural change by which it is accompanied, such as pneumonia; at other times, diagnosis stops short at the recognition of a pathognomonic symptom, such as whooping-cough: again, it may mean to express the starting-point or principal fact in a group of symptoms; or some general condition but imperfectly understood, or some condition which is not understood at all. In all of these instances we notice two things; first, that diagnosis—looked at from its scientific side—is the step from particulars to particulars, from those which are observed to those which during life can only be inferred; the step from the one or the one hundred to the whole: second, that diagnosis—regarded practically—is the giving of a name to the disease from which an individual suffers; the ticketing, and as it were placing of that malady in some niche with others that resemble it, so that it may be known and brought out when required. But let it be remembered that the principles upon which names are constructed are so various that no expression can be framed to convey their meaning, in so far forth as that it should carry further what is meant by diagnosis.

PATHOLOGY.—When a patient presents himself for examination or for treatment, he tells us of certain things that he feels or sees which are wrong, and which we call "symptoms"; we ask him questions and learn additional facts of a similar class; we observe him and notice other facts which he can neither feel nor know by independent means, and these we call "signs" or "objective symptoms." From what we are informed, and from what we observe, we pass on to the inference of other facts; we believe, when some three, four, or more changes from the healthy state are present, that other alterations exist; and this belief is more or less strong, and its character more or less definite, according to the state of medical science, and our knowledge of it, at the time that the patient presented himself. We *infer* certain things, certain conditions which we cannot see, but which we may, in some measure, classify, and therefore call by distinctive names. Thus heat of skin is a symptom from which we infer a number of ulterior conditions. The reason for this heat of skin may—other symptoms being regarded—be conjectured by us to be an altered blood state, such as typhoid fever, tuberculosis, or the like; it may, on other symptomatic evidence, be referred to a change in some particular organ, such as inflammation of the lung, or destruction of a portion of the spinal cord; and we may give names to the general conditions, part of which we have observed, part of which we have inferred. This is what we call diagnosis in its practical sense; but that which makes diagnosis possible is the existence of a certain amount of information about the relations subsisting between different organs, and about the modes in which particular organs may become altered in function or in structure. We observe a change in the quantity, colour, or other qualities of a certain secretion, and we infer from this that there is diminished, increased, or perverted action of a certain organ. We examine further, we discover other changes, and we infer the nature of the disease which that organ has undergone, or through which it is now passing. What in this sense is true of one organ is more or less true of all, and of the organism as a whole, so that we are able to give some general expression to its general state; and thus we speak of paralysis, fever, anæmia, suppression of urine, weakness, &c., and so advance from symptoms—by diagnosis—to pathology. This is what we do in particular cases; finding certain symptoms and knowing certain principles, we place the individual who presents those symptoms in a particular category, and call his disease by a name that is understood; and in this way the process of thought which we call "diagnosis" is a bridge across from "symptoms" to "pathology." Diagnosis is, then, the practical application of what we know about pathology; and its accuracy will be in proportion to the amount of our information and to the keenness and readiness of our observing power. Pathology, therefore, is the foundation, the essential condition, of diagnosis: for it would be simply impossible to advance, from the observation of symptoms, one step towards the recognition of the nature of disease unless that step were based upon pathology; *i.e.*, upon a knowledge of the conditions under which morbid changes occur in structure and in function, and also of the modes in which such changes may so affect organs as to render themselves appreciable during life. Practically, as cases come before us we observe symptoms, and we diagnosticate pathological conditions; but we could form no diagnosis without pathologic knowledge, and diagnosis is in reality but a portion of, or the practical application of, pathology. Theoretically, however, pathology is the groundwork of diagnosis; and not only so, but of all valuable and correct observation; and thus the one is seen to be but the necessary complement of the other in the practice of physic. The one is a science, the other is an art; the latter could not exist without the former; the former grows daily by the application of the latter.

By pathology, then, we mean the general doctrine of disease, the knowledge of the conditions under which it occurs, and of the kind of change which it expresses in the functions of the body. We mean also the inter-relations of different organs, or systems of organs, whether these may be compensative or sympathetic or antagonistic of one another. By the pathology of a disease we mean the scientific classification and nomenclature of its phenomena, and the interpretation of the conditions under which they have arisen. Pathology is to the body, under diseased conditions, what physiology is to the healthy organism, viz., the law of its being, or rather the best expression that we can give to what we believe that law to be. In its detail we must embrace all changes in either structure or in function; but in its common and general acceptation it is used to express the idea that is entertained of the primary, or essential, or most important change in both; and the bearing that this has directly upon life as a whole is in its statement the unravelling of the problem of what we ordinarily mean by pathology.

PATHOLOGICAL ANATOMY.—Structural changes in some organs are so constantly and definitely related to functional alterations observed during life that "pathological anatomy" in some maladies constitutes the most important, if not the major, part of their pathology. There are other cases in which structure-changes cannot be shown so to account for all the detail of symptoms; and in these, pathological anatomy has its interest, but is of less immediate value. And, further, there are diseases with regard to which pathological anatomy has hitherto taught nothing that is worth our knowing: while, on the other hand, it has not seldom exhibited the existence of disease, never suspected during life, and yet dire enough to be the cause of death, and thus to show that our diagnostic powers are not such that we may boast of them.

Unquestioned as is the value of pathological anatomy, it is no less unquestionable that this value may be overrated and misapplied; and it is possible that such mistake may exist at the present day. Let us, therefore, remember what pathological anatomy is, and what it teaches. It is the condition of an organ after death; when tissues are cold, ordinary chemic changes have begun, secretion and living motion have ceased, circulation has stopped; and all that we know to be unexplained by ordinary physical conditions, and that we call "vital," has gone, and gone we know not whither, and know not how. Pathology, on the other hand, refers to the conditions and modes of action of the organs when they are warm; when chemic changes seem to be directed by a power that cannot yet be explained by chemic force; when sensation and motion are constantly placing the organs in new positions, in regard to other organs, and in new conditions, in so far as relates to their own integral parts; when the blood is constantly flowing, and affecting as it does so, both the tissues and itself, not leaving them as it found them, not leaving them as it came; when all that we understand, and all that we dimly guess at about that complex force or principle, combination of forces, condition or what not, that we call "life" is the director or harmoniser of all we see, or is engaged in what seems a fierce struggle with powers it has long directed, but which having now risen in defiance of its authority, seem likely to accomplish its dethronement.

Everything that we can see is altered by that change from life to death; and pathological anatomy has to do directly with physical conditions, which may be partially causes, partially effects, partially conditions of, and partially unrelated to the disease of which they are but a part, although an important one. If everything that we can see is thus altered in the step that all bodies make before they come under the scalpel or the microscope of the pathologist, still more altered is almost everything that we cannot see, but which we have inferred to exist from our laborious physiological investigations. It would seem therefore that pathological anatomy is about as capable of furnishing, *per se*, a notion of disease, as dissection would be of teaching physiology; and if we are to exalt into such undue prominence—as it has been the fashion of late years to do—this branch of science, which is yet only a branch and not the science itself, it would be nothing more than consistent to attempt to write biographies from post-mortem examination and to construct the history of a nation by exhuming the bodies from its graveyards.

Pathological anatomy has reference to one element of disease—structural or tissue change—and that only under conditions very different from those which exist during life, and when only disease can be said to exist. Further, we get the materials for examination when disease has passed through all its stages, and through that final one, which cannot be said to form a part of either life or of disease. It is only when, by accident or intercurrent malady, a patient is struck down in the earlier stages of morbid change, that we have the opportunity for observing the kind of alteration which exists at such most important periods; and even to them is added all that we have already described, and probably much more than we can even guess at, by the great fact of death. Disease being an amalgam of change in function and in structure, is represented anatomically only by the latter: disease, having a history, and passing through stages, is shown to us only in one stage, and with infinite predominance of frequency in the last stage: disease, being a change in the conditions of life, is shown to us anatomically only in the condition of death: while general pathology, therefore, may embrace all that we know or can know of the mechanism of human suffering, pathological anatomy but touches the human body when the period of suffering has passed.

But the facts revealed by a study of pathological anatomy have a peculiar kind and a high degree of value, which we would most unwillingly underrate. There is an intimate and constant relation between function and structure and we believe that although certain structural conditions have yet escaped our observation, they may hereafter be rendered patent to the senses of the observer; and on the other hand, we hold that there are some structural changes which may always transcend our powers for their immediate recognition: but, notwithstanding these facts and principles, we must remember that where anatomical changes have been discovered and verified, they have thrown unexpected light upon previously dark and complicated problems; and that they have possessed—in themselves and by their very nature—a definiteness or precision, and have been susceptible of description and measurement to a degree that is quite unattainable by our present modes of research in regard of functional change. In pathological anatomy, what we have, however little it may be, is definite, describable, demonstrable, and measurable. These characters constitute its great value; and it is against its undue exaltation—and not its proper use

—that we raise our protest. Let us be as exact in our inferences from its facts as we may be in our observation and description of them, and then pathological anatomy will take its proper place, and we shall learn from it its most useful lessons.

PROGNOSIS.—The practical test of a true science is the power which it confers of prevision, or of knowing now what will follow hereafter. Some sciences have attained to this point, as we see daily illustrated by physics and chemistry; but as yet medical science has arrived at only very partial security of forecast. And yet the foreknowledge of the consequences of a present disease is that for which patients and their friends often seek from the physician with the greatest eagerness. When we can prognosticate with certainty medicine will have become a science. At present we only, with different degrees of nearness, approach this end. We may describe the probabilities of a given disease; we may even measure them; we may accept or reject lives at insurance offices; or we may affix a numerical value to their duration, but we deal with doubts and not with certainties. Life is too subtle for us to know or measure all its possible contingencies; and our information is too scanty to render us thoroughly satisfactory interpreters of the outcome of any malady. But, with all this doubt, much may be accomplished for the safety of society, and the relief of individual anxiety or care.

In prognosis we have almost always two ends to consider: the immediate effects of the present illness, and its remote consequences upon life. We have also two main elements by which we are guided in judging of these ends, viz.: the local changes which we may directly appreciate, and the general conditions which we may infer to underlie them, or to be, in some way, their consequence.

Prognosis with regard to the immediate effects of a present malady is guided mainly by the degree to which it interferes with any or all of the great vital functions, the circulation, respiration, innervation, or nutrition of the body. Prognosis in regard of the ultimate issue of a malady is based upon all these, but still more frequently upon the recognition of changes often minute, in either function or structure, which our knowledge of pathology leads us to interpret for either good or evil. For example, a man is suffering from pneumonia, and we may—finding his general functions performed with an amount of ease consistent with life—infer that he will recover from the attack which to other eyes may appear most threatening; but we may discover physical signs of tubercular disease, —slight, even unnoticed previously—and these teach us that the ultimate prognosis is unfavourable. In like manner, a child may be taken with convulsions which appear as frightful as only convulsions can do, and yet we may give a favourable opinion as to the present illness; while, on the other hand, some much slighter convulsive movement accompanied by heat of skin, a variable pulse, an obstinate vomiting and constipation, and a history of failing health or of hereditary tubercular taint, may lead us, in the midst of what seems a trifling malady, to augur the worst results from what we believe to be the onset of tubercular meningitis.

In prognosis, therefore, we must bear in mind the two objects we have set before us, and the two classes of means by which we may advance towards them. The immediate prognosis turns upon the degree to which great vital functions are interfered with: the remote depends upon the nature of slighter changes, of which pathology teaches us the meaning.

THERAPEUTICS AND HYGIENICS.—In the prevention or treatment of a disease our science culminates and becomes an art. Unless it can accomplish one or the other of these ends, the world would do as well without as with our aid. It is of some value to know the probabilities of our state, but it is of comparatively small value to have this knowledge if we can do nothing either to ward off, alleviate, or cure disease. We may prepare some people for the worst, we may dispel some groundless fears; but our mission is to do more than this: we have to try to "cure the curable, and comfort the incurable."

In the prevention of disease regard is had to the condition in which the individual is placed, to his hereditary or acquired constitutional peculiarities, and to the minute physical or functional departures from health which we may discover. In the treatment of disease no one of these can be lost sight of with impunity, but we are guided principally by the actual symptoms present at the time. These symptoms, however, it must be remembered, are of two orders: from the one set we learn the actual physical condition of an organ, or a group of organs, such as inflammation of a lung, congestion of the liver, or paralysis of one side of the body; while from the other series we become acquainted with the state of the system generally, whether this be antecedent to the local change, its cause, its effect, or a mere coincidence of its existence; and from such a group of symptoms infer the existence of dyscrasiæ, such as tuberculosis, carcinoma, or the like, and appreciate the presence of vigour, or of asthenia, of sound constitution, or of impaired health and wasted strength.

To the most superficial observer it must be obvious that therapeutics has undergone great and important changes, that the mode of treatment now adopted for many diseases is just the opposite of that which was in vogue a generation ago, and which lingers even in recent editions of standard books, although their authors have long since ceased to follow the directions which they still give to others. A few years ago the treatment of inflammation of an important organ was laid down definitely; such and such things were to be done, and no questions were to be asked as to whether the case was of this, that, or the other type. Inflammation was there, and blood was to be taken; low diet was to be enjoined, and lowering medicines were to be exhibited; and supposing the inflammation did not yield, the forces of attack were to be again placed in action: but here evidently there crept in some distrust of the theory at the bottom of the practice; for, instead of general bleeding, leeches or cupping were to be employed, and then only to a mild degree. Somehow or another the inflammation was to be put down, and it not rarely happened that the process urged against the bugbear "inflammation" proved fatal or highly injurious to the patient. If we can by bleeding, and by it alone, save the eyesight which may be threatened by iritis, or if we can by depletion save a life which is endangered by laryngitis, we are quite justified in adopting that measure, although it may entail some injurious consequences. It would, however, be as unkind as it would be unphilosophical to relieve the pain of a simple pleurisy by abstracting blood, in such amount as should damage the individual in after years, when equal relief might be obtained by poultices and patience. We still find it written, if these conditions are found—a hard, full, strong, frequent pulse, with great heat of skin, no prostration, impending evil from this condition being patent as the phenomena themselves—then bleeding, antiphlogistics, and the like must be employed. But, as a matter of fact, we do not find these cases, and the more common *on dit* of medical practice is to the effect that as the inflammation seemed extending, the quantity of wine has been doubled, the supplies of beef-tea increased, and bark and ammonia given more frequently. Partly to account for, and partly to justify, so material a change in our modes of dealing with disease, it has been assumed that the *vis vitiæ* of the British constitution has been lessened, or that the so-called "type" of its maladies has altered; an assumption which has little to be said in its defence, and still less that can be regarded as its establishment. A more simple, and we believe accurate, explanation of the change is to be found in this, that previously theory was the groundwork of therapeutics, and that now fact is the basis of treatment: that, years ago, diseases were treated by their names, and that now they are treated by their known conditions: that local changes were the main guides in times gone by, but that the general state of the patient is that which in these days the physician esteems as his therapeutical informant. When pathology scarcely existed, medical practice was an empirical art; and had, with the few advantages of that position, all its evils: whereas, with the growth of pathology, therapeutics, still an art, has become, or is becoming, a science; and, knowing more accurately the limits of its powers, is content to attempt less heroic measures, being convinced that it does less harm. Much is done by medical treatment now, more real good than ever was done before, but it is done in a different way, and with another aim. Disease is detected in its earlier stages, and often arrested there; but when developed the patient is guided through it, if he can be, and is not sacrificed to some wild attempt at its destruction.

What we now believe and act upon is no set theory regarding the nature of particular diseases, or disease in general—modern times have not been devoid of theories upon which the fathers of medicine would justly have turned their backs in derision; but such notions, although they may have misguided a few individuals, have soon found their proper place, or no place at all in the science of the day—what we do believe and act upon is a better knowledge of the laws and relations of morbid change: we see that the man is greater than his maladies; that his general condition is of more importance than his local ailments; that disease is a change in him rather than in some part of him; and that no treatment can be of any real service which sacrifices the greater to the less. In all treatment, therefore, what is general is to be dealt with upon the basis of a true appreciation of the general pathological condition, and this in spite of all theories in regard of local changes, however they may be termed, whether they come to us with names hoary with age, or scarcely intelligible, and even sometimes ludicrous, from their novelty. If the general condition be one of weakness, it matters not that the brain, the heart, or the lungs may be in the state of so-called "inflammation"; the weakness is the one thing that demands immediate treatment, and to neglect its treatment is to run the risk of sacrificing the patient to a theory of a compound state even now but imperfectly understood. This is the starting-point, the essential element in therapeutics; but the mode in which the treatment should be applied will often be determined by the nature and position and origin of the special lesion; and these conditions of the latter will direct the management of those means and appliances which, employed locally, will prove of service to the injured organ.

CLASSIFICATION OF DISEASES.—A correct classification is a condition of the existence of a science, and an essential for its teaching; but we do not think that medicine has yet arrived at this high position.[1] That it will advance to it, that it is making progress towards it, we have no doubt; but, at the present time, we must admit that imperfections abound in every system that has been propounded. The problem is too vast and too complicated for solution now, and we have therefore to adopt that which appears to possess the greatest amount of practical advantage.

It would be useless here to spend time upon criticism of the various schemes which have been proposed; we prefer rather to state briefly the very simple plan upon which this book will be constructed. The first division of diseases will be into their two great groups; 1st, Those in which the whole organism appears primarily and prominently deranged, and 2nd, those in which special organs or systems of organs are, in like manner, affected. Subdividing the first group we have two classes: A, those in which the disease appears to be developed by causes operating from outside the body; and B, those in which the malady seems to depend upon some internal change. Thus in the first subdivision we find the acute specific diseases, and their analogous affections; in the second gout, rheumatism, scorbutus and the like. Subdividing the second group we have many classes, consisting of diseases of systems of organs, such as: A, diseases of the nervous system; B, diseases of the digestive system and its appendages; C, diseases of the circulatory system; D, diseases of the respiratory system; E, diseases of the urinary system; F, diseases of the reproductive system; G, diseases of the locomotive system; and H, diseases of the cutaneous system.

Each of these is in its turn again subdivided, upon the primary principle of general or partial change, so that, in regard of the nervous system, for example, we have, 1st, those of general or undetermined seat; and 2nd, those depending upon distinct local change in its parts, anatomically considered: and this leads to further reduction into affection of parts, such as *a*, brain; *b*, spine; *c*, nerves: whereas the final division is based upon the nature of the changes which these portions of systems undergo.

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[1] This preface was published in 1866.

If this mode of arranging diseases has no other merit, it has that of simplicity; and it will, we believe, bring, as a general rule, into closer proximity than some more ambitious systems would allow, those diseases which have the most intimate clinical association. It involves little theory in any case, none in many, and may therefore commend itself to those who realise, amid the great progressive science of medicine, the difficulties and dangers which attend upon all nosologies which, based on theories, partly right and partly wrong, carry with them, and only with great effort disentangle themselves from what is erroneous in their groundwork, and *a fortiori* luxuriant in their aftergrowth.

THE PRESENT POSITION OF OUR KNOWLEDGE:

Being the Address in Medicine delivered at the Forty-second Annual Meeting of the British Medical Association, at Norwich, on August 15th, 1874.

It is well that we should sometimes ask ourselves, with regard to the special sciences to which we devote our lives, the questions—Whence have we come? and Whither are we going?—and this has been obviously felt by those who, in directing the affairs of the British Medical Association, ordained that there should be an annual "Address in Medicine."

We can appreciate the nature of our present position only by a regard to the past and an outlook towards the future. If we would know what the present position of medicine or pathology really is, we must see whence it has come, and whither it is tending; inasmuch as reference to the past is necessary for the comprehension of work that is in progress now; and a glance towards that which is to come, and which must be the outcome of our present work, is also essential, if we would test its truth or attempt to measure its value.

If Linnæus asked like questions about man, with an outlook into regions which have not as yet been drawn within the limits of exact science, we, too, in our review of pathology, must sometimes pass beyond the lines within which that science has, perhaps too often, been confined, and by which it has been sometimes cramped. Medicine is no isolated science; we cannot draw a line round the group of facts which we so denote—nor, indeed, around any group of facts—in such fashion that we may truly say that within its enclosure the whole of any one science lies, and that outside such enclosure all facts must receive a different name. The whole of any one science is the whole of all; and pathology has its biological, chemical, physical, and mathematical elements on the one hand, and its mental, moral, and social bearings on the other.

In the somewhat perilous task that I have set before myself it is not my intention to attempt to furnish an account of the details of recent scientific work in medicine; but rather, by an examination of our past and present relations to four great propositions, or—if I may use the term—articles of creed, to show how they have affected our modes of investigation in the past, how they are governing or guiding our labours now, and what are the results which we see coming from the now existing and prevailing tendencies of thought.

The four articles of creed to which I refer as influencing, for good or for evil, the progress of scientific pathology, are a belief (1) in life, (2) in man, (3) in individuality, and (4) in the speciality of disease. The relation of the worker to the notions entertained by him with regard to the facts connoted by each of those four expressions, must determine the character and bearing of his work, and it is my object to try to bring before you the nature and effects of that relation.

1. Those who have gone before us in the study and treatment of diseases have held, and that very strongly, to a belief, *first*, in life, *i.e.*, in a power, force of condition of matter which was *sui generis;* which could not be explained away; which could not be referred to any combination of physical powers; which had an origin, the nature of which was beyond the reach of our modes of investigation; the career of which was, although often "sore let and hindered," outside of, and above all temporary and material obstacles; and the end of which, as we see it here, was but the beginning of another development, for the features of which we must patiently wait until we ourselves had passed into another state of being.

It is obvious that this view of life often led investigators of disease away from objects which they should have examined, drove them into conditions of thought which were fatal to a correct appreciation of the truths they wished to know, cramped their notions of the possibility of preventing or curing sundry affections of both mind and body, and perverted the efforts which they did make for the alleviation of ills they could neither arrest nor remove.

Some of the names of familiar diseases point to the nature and key-note of the pathology of the times in which they were first applied, and illustrate the first point that I have mentioned. The terms "morbus sacer," "morbus comitialis," "morbus sancti Weitii," the "king's evil," "St. Anthony's fire," and the like, conveyed meanings that are now happily lost to science. The affections thus denoted were only a few of many which it was profane to attempt to account for by other than occult and mysterious influences upon the greater mystery of life. The investigator was driven back and away from thoughts or processes of examination which should intrude into these secret places of the unknown.

Again, the notion that life-processes were totally dissimilar from all physical and chemical changes, so that the life-force held all these changes under its own control, effecting by its direct agency movements both coarse and molecular, such as bore no relation whatever to the results of well-known chemical and physical forces, led the minds of the most earnest thinkers away from the proper track of scientific and legitimate research, and placed them in a condition of hopelessness and confusion such as nothing but a strong, and, perhaps, excessive revulsion could remove. Diseases which were held to be the result of some direct interference with the higher processes of life, such as insanity of mind and many of the disturbances of motility and hallucinations of the senses, were maltreated or only tended by incantations, or by the administration of some mineral, vegetable, or animal substances, selected on no observation of their real therapeutic effects, but simply upon some mystic ground, some tradition, fable, or dream. And, again, the efforts that were made within what was held to be the legitimate region of therapeutics, were misdirected and limited by the notions of volitional opposition to be overcome, not only in the patient, but in this organ and in that, and the processes directed to overcome this resistance were often absurd, and sometimes worse.

A change has passed over all this mode of thinking; processes and phenomena which were held to be among the sacred mysteries of life have been shown to be facts of chemistry and physics—facts which can be recorded by figures, words, and drawings. The chemistry of digestion, of assimilation, of secretion and excretion, has been pursued and unravelled with scrupulous care and marvellous exactness. We have learned something of the rate of movement of nerve change; of the nature and mode of the operation of impressions on the organs of special sense; of the conditions of muscular contraction; of the relation between definite movements of the limbs and certain portions of the brain, and, indeed, of many curious links between some of the higher processes of thought and special portions of the nervous centres. Diseases have been produced by artificial means; one disease has been used to destroy another, and vaccination has done much to diminish, and may probably succeed in eradicating, smallpox; diseases have been removed by chemical processes, both directly and indirectly; the diabetic process has been controlled by a diet-rule; sarcinæ have been killed by sulphurous acid; and electrical appliances have restored wasted muscles and inactive nerves, when these were apparently beyond all reach of hope. Modern pathology, by the aid of the microscope and the test tube, and by other means, has read many of the secrets of life, and the physician has been able so to wield the forces of life as to set right much that was wrong, and bring back the functions of organs which were virtually dead.

But, granting that we have removed much of the traditional mystery which obscured the facts of life, that we have resolved many so-called living actions into chemical and physical processes, and have described them in other than "vital" terms, it may still be questioned whether or no we have advanced many steps in the solution of the ultimate and real mystery of life. The tendency of the present day is to believe, and act upon the belief that we have done so; and, as it seems to me, to push aside awkward facts as irrelevant or unreal, and to smother questionings by representing them as either solved, insoluble, or worthless. It seems to be almost believed by some that, if the chemical elements of which organised and living beings consist are brought together under favourable conditions, they arrange themselves into vital forms and execute vital functions; and just as certain bodies in solution may assume definite crystalline form, so other bodies may agglomerate into organic form, and exhibit the properties of life.

Again, the obvious correlation of the physical and vital forces has led some to believe not only in the correlation of forces and actions, physical and vital, but, further, in the identical nature of the two; and so that which constitutes the true differentia of life appears to me to have been lost sight of in the very brightness of the light which has been thrown upon the conditions of its action. It is well known that heat, electricity, light, air, food, and other external physical forces, impressions, and materials are the agents by which the processes of life or vital actions may be educed, and without which they fail to show themselves; but, when the idea is entertained that life itself is nothing more than an aggregation of the resultant movements of these conditions, materials, and forces, it seems to me that we are wrong. Impressions from without may determine the occurrence of motion or sensation, but the secret of life is still hidden in the organism which transmutes the one into the other.

Physical force may be correlated to vital acts, but life itself is the special property or condition of the special material which effects that peculiar relation, and it is as far from comprehension now as it was a thousand years ago. Heat applied to a fertilised and "living" egg may set in motion all those chemical and physical changes and movements which make up the living processes of a growing bird; but, if the egg be not living, to begin with, heat but hastens another series of chemical changes—those of disintegration, putrefaction, and decay.

Life is still hidden in the wonderful cells from which all these changes of structure and function take their start. Again, if we apply electricity to a nerve-trunk, a cerebral convolution, or a more central structure of the brain, motions of definite character, association and sequence may result; but the secret of life still lies hidden in the properties of those nervous elements which transmute such electrical impression into the fact of muscular contraction, and association of muscular contractions, in the movements of the limbs.

To illustrate my meaning here, let me remind you that every so-called chemically "elementary body" is known as such only by the power which it possesses of so modifying materials and forces with which it is brought into contact, as to be distinct in its sum of properties from every other elementary body. We can describe it only by terms which involve some facts simpler than those of chemistry; but the idea is irresistible that, *e.g.* gold, silver, and lead differ from one another in the fact that each of them has in itself a "something"—we know not what—which determines the various bearings of each of those elementary bodies under the varying condition to which they may be exposed—a something which makes them what they are, and to which we unconsciously refer in thought when we give them names and places in scientific categories. It is this individuality, or "tendency to individuation" as it has been called, which constitutes that which has been, but as I think incorrectly, termed the "life" of those bodies; for if we apply the word life to them, we need another term to denote the special properties of the so-called "living things." The process of thought which is true with regard to the chemically elementary body, may be applied with greatly augmented force to the living organic body—no matter how simple or how complex; that which makes it living, which alone justifies the attribution to it of the properties of life, is the possession of an individual power of behaving in such a way—under given circumstances, and amidst the brunt of conflicting forces, and surrounded by varying materials,—that it evolves the phenomena we designate as vital.

I do not mean to say that any one distinctly says to others, or even to himself, "I can make living beings by putting together the elementary bodies of which they are composed, under favourable conditions;" nor do I think that there are many who would say, "Life differs in no respect, in all its details, all its relations to personal consciousness, to moral sense, to intellectual product and to social history, from the physical forces whose modes of action we know so accurately as to be able to foretell the results of experiments we may make, or of processes which we see advancing." But I do say this, that many seem disposed to think that, if we could make our experiments only a little more clever, that if we could carry our machinery of experimentation but a little further—and there is no doubt that we shall do so very shortly—we shall get rid of the term and the idea of life itself, and so make a great advance in science. It may be that this will be done; but, for one, I believe that it will not be done. There is, for my mind, no approach to a solution of the problems of either the nature or origin of life to be found in pointing out a certain resemblance between the protogenes of Hæckel and "drops of oil suspended in a mixture of alcohol and water." The resemblance is superficial, the difference between them is essential. Nor need we go so far backwards to see the fallacy of reasoning of such kind. Those simple cells, the germinal vesicles of two eggs—says of a pigeon and a parrot—are much more alike than are the very lowest forms of life and globules of oil covered with a coating of albumen, or suspended in alcohol or water. Neither microscopist nor chemist can distinguish between them; and yet, by the application to each of them of the same simple force, heat, the one develops into a bird, which, if it escape the gun, has yet but a short term of life, and a very limited intelligence, while the other has a much greater diversity of gifts, and a span of life beyond that of two or three generations of men. If these two cells are really alike, *i.e.*, if there is no difference between them, then their subsequent development is but a series of creative acts, a making of something out of nothing. If they are not alike, but are so far unlike as of themselves to determine all the divergence of structure, function, and durability which exists between the pigeon and the parrot, we must admit the presence of a force to which we know nothing akin, and the existence of the most marvellous differences of property in two objects which we can see through and through, and yet be unable to distinguish from one another. The long word "differentiation" affords us not the slightest help in this matter, for all that it can mean is, that a difference pre-existing, but the nature of which is absolutely unknown, becomes recognisable by our senses. There must be, hidden in those apparently homogeneous structures, differences of either matter, or of force, or of both, as great in itself as all that which is subsequently displayed in the plumage, the habits, and duration of the two birds I have mentioned. To use the term "differentiation," as if it conveyed any explanation of the facts, appears to me to be taking refuge in a metaphysical subtlety in order to hide the imperfections of scientific observation. It may be that, hereafter, we may discover some method of appreciating the differences between these and a thousand other apparently homogeneous organisms, but we have not done so yet. They present themselves to us like so many colourless solutions, it may be, of a thousand different salts. They all look alike; we can see no differences between any two of them, and yet they contain within themselves all the differences that exist between the so-called elementary bodies. Apply certain tests to them, and their differences become apparent; this clear, colourless solution throws down a precipitate, that becomes yellow, and a third turns black. But the essential difference between this elementary body and that is no greater now that it has become revealed to our eyes than it was when it lay concealed in the transparent and colourless solution. The only method by which we can, at present, distinguish between the earlier and simpler forms in which living organisms present themselves, is by waiting and watching them as they grow, *i.e.*, as they pass through a series of processes, the like of which exists in no other form of matter, and to which, by the very conditions of our mental and moral nature, we are bound to give a name, which shall distinguish such changes of structure and function from all other processes, and such name is "life."

In what I have said, the terms matter, material, structure and organism are employed, as well as the words function, property, and force. It seems to me that it is impossible to move without some one or more of each of these two classes of expression. So far as the external world is concerned, we can know nothing of matter, and say nothing about it except in the terms of force; and, on the other hand, we know nothing of force external to ourselves except in association with matter, and can describe it in no other way than by words which relate to material change. But does not this very idea of force—upon which we are so dependent for our knowledge and description of matter—arise from within ourselves? Is it not the result of our consciousness of external impressions, and of their effect upon us; our consciousness of like, dislike, choice, purpose, power, and action? If it be so, we can know nothing about matter except and inasmuch as it affects ourselves, and so find the key to an acquaintance with its manifold varieties of action in a knowledge of the phenomena of life. If we would seek for its analogues in the globules of oil, we must also study its conditions in the mind and heart of man. However keenly and satisfactorily many of the processes of life may be referred to simpler agencies, there will, perhaps, ever remain the same kind of mystery with regard to life itself that still shrouds the nature of those simpler forces, such, for instance, as gravitation or heat, with regard to the nature of which many have ceased to question. "As to what weight and attraction are," says the leading thinker of much modern science, "we have nothing to do with that, for it is not a matter of knowledge at all. Theologians and metaphysicians may imagine and refine about such questions; but positive philosophy rejects them." It has been admitted that their essence is beyond our ken, and that we can but study their phenomena; we have not tried, or have failed if we have tried, to reduce them to a common denominator. But with regard to life, we have drifted into a sort of belief that it is to be decomposed, explained away, or got rid of; and that our true line of action is to be followed by such a belief in the future results, rather than in the present or the past facts of science. But I claim for life that it be treated with a respect like to that which we have accorded to gravitation; and I do so because, notwithstanding all the researches of modern science, and all the clever analogies of recent thinkers, it still stands alone, undecomposed by chemist or histologist, and presents a series of phenomena which no known physical or chemical process has explained.

The mode in which the state of mind that I have described affects us, as physicians and surgeons, is, I think, injurious. Among other evils which come from it, I will mention two. The first is, the growing disregard of what may be termed subjective symptoms of disease; and the second is the effect which such frame of thought exerts upon therapeutics.

With regard to the former—"subjective symptoms"—is it not coming to this, that but little attention is paid to the accounts which patients give us of themselves, their ideas, emotions, feelings, and physical sensations? These are things which we cannot weigh in our most guarded balances; measure by our finest scales; split up in our crucibles; or describe in any terms save those which are peculiar to themselves, and which we cannot decompose. These symptoms are often disregarded and set aside; and the patient, whose story of disease is made up of them, is thought fanciful, hypochondriacal, hysterical, nervous, or unreal; because, forsooth, we have physically examined thorax, abdomen, limbs, and excretions, and have found in them nothing wrong; because we have looked at the retinæ, examined the limbs electrically, traced on paper the beatings of the pulse, weighed the patient, and have not found him wanting; still he is miserable, in spite of placebo and assurance that there is "nothing organically wrong." There may be in him the consciousness of a deep unrest; or of a failing power, which he feels, but which we cannot see; or of a something worse than pain, a sense of "impending evil," that he is conscious of, in brain or heart; a want of the feeling of intellectual grasp, which he may call "failure of memory," but which memory, when we test it, seems free from fault; a want of the sense of "capacity for physical exertion," which seems, when we see him walk or run, to be a mere delusive notion, for he can do either well and easily to our eyes and those of others; and so he is called "nervous," and is told to do this or that, and disregard these warnings that come to him from the very centre of his life. And let me ask whether or no it has not again and again happened in the course of such a history as that which I have only faintly sketched, that some terrible catastrophe has occurred? Do we not see minds gradually breaking down while we say there is no evidence of organic change in the brain? hearts suddenly ceasing to do their work, when, after careful auscultation, we have said that there was nought to fear? Suicide or sudden death sometimes disturbs the calm surface of our scientific prognosis of no evil; we may be startled, and may then see all that we ought to have seen before. But when the ripples that such unforeseen events have occasioned on that smooth surface have subsided, we go on as we have already done, and still pay but little attention to what the patient feels, and delight ourselves in the precision of our knowledge with regard to physical conditions of which he may know nothing and may care still less. No one can appreciate more highly than I do the value of precise observation, but I do not believe that minute, delicate, and precise observation is limited to a class of facts which can be counted, measured, or weighed. No one can see more distinctly than I do the wrong conclusions at which a physician may arrive by accepting as true the interpretations which fanciful patients may offer of their symptoms; but I am sure that, if we pay no heed to these mistaken notions of a suffering man, we may lose our clue to the comprehension of the real nature of his malady! Morbid sensations and wrong notions are integral parts of the disease we have to study as a whole, and we are bound to interpret their value for ourselves; but we can ill afford to set them aside, when we are as yet but in the dawn of scientific pathology, and are endeavouring to clear away the obstacles that hide the truths we hope hereafter to see more clearly about the mystery of disordered life. The value of such symptoms may be slight in some kinds of disease, when compared with that of those phenomena which may be directly observed; but we are bound to remember that there are many affections of which they furnish the earliest indication, and there are not a few of which they are throughout the only signs.

Again, the view that is taken of the correlation of vital and physical forces, when it assumes the form that I have mentioned, and which amounts to a practical ignoring of the fact of life, is, I think, mischievous in therapeutics. That which is the differentia of life is, as it seems to me, lying in the organism, and is that which makes it capable of transforming physical forces into vital acts. But what we are often attempting to do in our treatment of disease is to elicit vital *action*, rather than to conserve vital *force*. We see that, by giving such and such drugs, we change—and as it seems, for the better—the mere processes of life; we may limit or increase muscular movements; we may augment the quantity of secretion here, or of excretion there. But, let me ask, do we not often see that, when we have effected these changes, when we have given diuretics, purgatives, diaphoretics, and the like, and have witnessed their appropriate physical results, the disease is no better than before, and the patient is worse? We have brought vital processes into play, but have used up the vital force in doing so. On the other hand, we try to check what appear to be excessive and exhausting discharges, or tiring and distressing acts; we try and often succeed in diminishing the frequency, force, or extent of certain vital functions that appear to be, and indeed are, beyond the normal range. But, again let me ask, do we not often see, when we have succeeded in lulling a cough and diminishing the amount of expectoration, that other and far graver troubles supervene; that, when a diarrhœa or diuresis has been cured, the patient is worse than before; that when a skin eruption has been removed, some nervous trouble takes its place? Again, by the administration of alcohol, or of other stimulant or tonic, we may often help a man to get through some work for which, without such aid, he was totally or partially incompetent; we have evoked an amount of vital action that would otherwise have been impossible. But do we not often see that we have really done more harm than good; that the weakness has increased, and that the necessity for stimulation has become aggravated, and that what was really needed was food and rest, which should have nourished the organism, built up the tissues, and replaced what was wanting in living force? We have helped our patient to do things he could not otherwise have done, but we have used up his life in doing so.

Once more: in the present day, electricity, in its many forms, has come again into fashion, and constant and faradic currents, chain-batteries, and magnetic belts are found as topics of common conversation or articles of dress, in boudoirs and clubs, as well as in the consulting-room of the physician. The mischief that is being done by such abuse of a very valuable therapeutic agent is grave and manifold; but is the profession altogether blameless in this matter? There are some conditions in which electricity is very useful, and useful by calling into play the function of nerve and muscle; but it has again and again been used when it could by no possibility have been productive of the slightest advantage, and when the production of such enforced action of muscle and nerve has but diminished the strength and exhausted both the energies and the endurance of those who had not one grain of either of those qualities to spare. Muscles and nerves have been driven into action when they needed rest; but that which has guided the practitioner into such mistaken practice has been the notion that to evolve function was the great end of treatment, whereas what was really needed was a conservation of the central nutrition, and a consequent addition to the stock of vital force. Rest, food, cod-liver oil, and soothing drugs were needed; and not faradisation, alcohol, or strychnia.

These points are enough to show the class of evils which may arise from what I hold to be a wrong way of regarding the relation between physical and vital force, between life and vital function; and I cannot but think that, by a review of our ideas of life, and by a regard to the objects, direction, and limits of our therapeutic agents, we may hereafter find it less frequently recorded in the domestic annals of our patients, that he or she had "suffered many things of many physicians, and was nothing bettered, but rather grew worse."

As ancillary to the line of argument which I have followed, there is much to be gathered from a regard to the recognised causation or etiology of disease. The external conditions which derange or disturb health may be grouped in the following manner:—(1) Those which change the due income to the body of ponderable, measurable, intelligible, and appropriate materials, such as food in all its forms, solid, liquid, and gaseous. These may be deficient, excessive, or unwholesome; and we know fairly well the results of bad eating and drinking, of bad water and bad air. (2) Those which interfere with the due elimination from the body of its waste products—faulty secretion and hindered excretion. (3) Those which diminish, derange, or exaggerate the amount or influence of certain imponderable agencies—light, heat, electricity, and the like; and here too, I would place physical injuries. (4) Those which in any way disturb the due exercise of the body in such way as to distort the balance between income and expenditure of these imponderables—for example, overwork, underwork, deficient motion, deficient rest, anxiety, and toil. I do not know what recognisable and ascertained external cause of disease might not be included within one or the other of these four categories; and by their aid we may explain a vast number of the morbid conditions which we have to study and to treat. But let me ask if, after the most careful scrutiny, we are not again and again compelled to say we can find no cause for the particular malady presented to us in this person and in that. We fall back upon constitution, predisposition, hereditary taint, and other easily employed, but most inadequately examined and utterly uncomprehended, words, to account for what we do not know, and can by no means explain; and by the use of such phrases we only shunt the etiology into a siding, or throw back for one or two generations that which is inexplicable in the present.

We know much of the conditions determining the occurrence and favouring the development of the acute specific diseases. We know much of the results of accidental exposures, of overwork, of faulty education, and of miserably defective hygiene. We know something of the conditions which may aid the growth of the group of constitutional diseases, and which may antedate the processes of natural decay; we know much that may be useful in its application to masses of people, and to this I shall refer hereafter. But what, let me ask, do we know, and know definitely, of the common starting-point of disease, of the so-called constitutional sort, in a large proportion of the cases that come under our care? It is worse than idle to assume that we know as yet truly the general etiology of cancer, of Bright's disease, of tubercle, of Addison's disease; or again, of that which determines the occurrence of many maladies of the nervous centres which crop out in "writer's cramp," torticollis, chronic chorea, locomotor ataxy, epilepsy, diffused sclerosis, or general paralysis. We often find nothing that we can honestly regard as a cause of such malady, or we lightly refer any one of them to conditions common to the causation or supposed etiology of all, and then fall back upon peculiar predisposition; for upon the most careful scrutiny of all antecedents, we are unable to explain why this man has Addison's disease, and that suffers from ataxy, why one suffers from cancer, and another from "writer's cramp." There is much that is as yet withheld from our most earnest gaze—much that, as it seems to me, we must as yet refer to a change, the nature of which we do not know, in the very innermost recesses of what we call "life." There is something radically and essentially wrong in that upon which all these so-called causes of disease are brought to bear; and I think we are driven by the facts of daily experience to believe that the organism—the living material which, by virtue of its own endowments, determines, in obedience to external impressions, all vital acts—is in itself at fault; and that its departures from the normal condition vary, and are different the one from the other, in such way as to produce those various modifications of structure and function which we term constitutional diseases. As physicians and surgeons, it is our part to conserve life by preventing, when we can, the inroad of disturbing agencies; to preserve life in its integrity of useful work and fit association with all that makes life happy;

to help it in its weakness, heal its suffering, lessen its sorrows, and soothe its closing hours; but I think we shall accomplish these purposes only by admitting its existence, its separateness from all other forces, acknowledging its mystery, bowing ourselves down before the enigma of its origin, and reverently humbling ourselves in face of its unsearchable but wonder-teeming end.

2. In continuing our review of the past and observation of the present, let me next remind you that the fathers and forefathers of pathology held a firm belief in the essential peculiarity of MAN. They believed that man was a creature in many respects allied to and resembling other members of the animal kingdom, which was, or had been brought into more or less complete subjection to itself, but presenting points of difference from the so-called lower forms of life far greater in their intrinsic value, although, perhaps, far less in their numerical representation, than the points of agreement or resemblance. Thus, and for this reason, the maladies of man had an appearance and received a consideration which could be understood and justified only upon regard to a belief in the entire separateness of man's life and history—in its origin, its purpose, and its end—from that of the most elevated and most familiar members of the animal kingdom.

The effect of such teaching was to set a limit to the acquirement of certain classes of knowledge which might be highly useful to man in regard of many of his bodily ailments. And not only so, but it led to an entire misapprehension of many facts that were of constant occurrence in the healthy and unhealthy lives of men. Actions which are commonly known and observed in man-actions of simply reflex character, of sensori-motor, or of emotional origin, in addition to all those which were regarded as intelligential, were separated by a broad line of distinction from all similar actions occurring in the most gifted animals. This being so, the attempts which were made to explain such phenomena in man had their starting-point, not in physiological method, but in metaphysical speculation. Animal life, in its various outgoings, was abased that man might be exalted. The term "instinct" was rarely applied to the latter; the possession of "reason" was denied the former. And in the present day we constantly hear, on the one hand, of the remarkable "instinct" of the dog, for example, as an explanation of some distinctly intelligential process; and, on the other hand, we hear many facts and functions of human life described in terms of intelligence, while they are, in reality, examples of but instinctive impulse, sensori-motion, or reflex action.

It would seem, from what we often hear, as if the idea prevailed that instinct grew up into wider and more complex function from the lower forms of life until it had reached its maximum in the highest and most gifted animals, and that from this point man started on an entirely new basis, and that all the actions performed by him, from the cradle that rocks his first infancy, to the coffin which at last cradles his second childhood, were the outcome of another and separate power. Herein we see the existence of a twofold error; for, firstly, the purely instinctive acts of animals are witnessed in their highest perfection, and in their most remarkable mechanical results, in such lower forms of life as seem to be altogether deprived of intelligence; whereas the introduction of intelligence in the higher animals stunts and overrides their purely instinctive acts. The bee builds its cell and the spider spins its web with an accuracy which the skilled hands of man might envy; but the dog, the cultured friend of man, learns to forsake the instinctive habits of his race, and to do things which no instinct could ever enable him to do, and to take joy in acts of obedience and affection, which might furnish, and have furnished, useful examples to ourselves.

Man, secondly, on the other hand, from earliest infancy to oldest age, exhibits much that is purely instinctive, and which deserves no higher or no other name. And this is seen not only in the baby feeling for, and kneading with its tiny fists, the breast that feeds it, nor in the second childhood that puts out its lips and grasps the hand that brings its food, but in all the "seven stages" of life that our great poet has described. In the schoolboy, the lover, the warrior, the justice, and the decaying senior, we see the several time-ordered instincts cropping out; and determining now, as they have done in the ages that are gone, that about and around which poetry may wrap its finest tracery of verse; upon which philosophy may build its brightest hopes, and from which, in another mood, it may shrink abashed and humbled; and by which religion is sometimes lifted into its highest phase and sometimes driven backwards, almost to despair. Each period or stage of man's life has its special instinctive characters, and few of my audience will think that, in saying so much, I have overstated the quantitative value which is at this time given to the merely physical powers and determining forces of the complex life of man. The tendency, as I read it, at the present day is to pass to the opposite extreme, and to see nothing distinctive in human life; nothing which cannot be explained in physical function, by reference to the lower forms of animal existence; and nothing in the mental and moral history of ourselves which cannot be referred to analogous processes of material change.

It does not seem to me that the well-known experiments upon decapitated, or otherwise injured, batrachians, in whom certain apparently purposive movements are observed, when external impressions are made upon them, furnishes the clue to a comprehension of the more complicated and volitional movements of man. The frog swims and leaps as soon as it has the bones and muscles which are the necessary mechanical apparatus for the performance of these acts, and the division of its anterior from its posterior brain-segments does not affect its capacity for such performance; but man has to *learn* to walk and to learn to swim. It is by a process of more or less laborious education that man acquires the arts of talking, writing, shooting, and the like, and not only so, but of even standing in the upright posture. He has, as it were, to create, or organise a series of formulæ or working-plans for his nerve-forces to act upon; and when he has done so, movements, and combinations of movements—at first difficult and volitional—become easy, and can be continued without any effort of the will. We stand and walk without conscious effort, and probably without any other than simply reflex operations of the nervous system, which has been trained to perform these so-called "secondary automatic" movements. But if we would walk across Niagara on a rope we should require much more special education, and probably some individual peculiarity of constitution. The complicated movements of some quasi-epileptics, when unconscious, are only repetitions of those which have been acquired by practice. I have never seen purposed movements in the limbs of a man who was paraplegic.

The mere repetition of impressions from without does not necessarily induce increased sensitiveness to their presence, or increased agility of movement. On the contrary, except upon one condition, the sensibility to impression is diminished, and the readiness of action is reduced, with each recurrence of the impression, until at last it is neither felt nor acted on. The one condition which is necessary to make all but the naturally innate sequences of motion upon sensation, or impression from without, possible, or more easy of occurrence, is "attention;" *i.e.*, the direction, the volitional direction of the nervous forces to the reception of the impression, and the performance of the act. The simply "instinctive" acts require no thought nor care; they are perfect at their first performance; their formulæ are a part of the original nervous endowment of the creature that displays them. They resemble the clinging of the tendrils of the passion-flower, or the firm hold of the tiny suckers of the amplyopsis, rather than the voluntary, or even secondarily, automatic acts of man or of the higher animals, which, so far as I can see, they do nothing to explain. Let us clearly separate between them; attach no higher value to those instinctive or automatic acts of man than is their due; but let us not, in our haste to generalise, lose sight of the main factor in all education of both mind and limbs, viz., the directive influence of the will, which, whensoever it may come, and howsoever it may work, is yet that which renders possible all the higher acts of man, and which should render it impossible for him so to forget his place in nature, that he needs to learn again the lesson that might be taught him by "the ox that knoweth his owner, and the ass his master's crib."

For myself, I must protest against the view that I have described, and I venture to do so, not as a philosopher or moralist, but simply as a physician in daily contact with those who are suffering from mental and bodily disease.

I see in the latter—the bodily ailments of men and women —as the most frequent causes of their occurrence, and as the most potent elements of their etiology, disturbances in the working of those social, moral, and intellectual processes which are unlike and apart from anything which can be even tortured into resemblance to the causes of disease in animals. The cares of professional life, the worry of the Stock Exchange, the heated excitement of the betting-room, the luxurious idleness of the club, the intellectually guided epicureanism of sensual excess, the feeling of the urgent pressure of family and social needs, as well as the fierce conflict between moral sense and religious training on the one hand, and doubtful practices and honest and dishonest scepticism on the other, are the most fruitful sources of loss of rest, recourse to stimulants and narcotic drugs, failure of appetite, disturbed digestion, malassimilation, "nervous break-down," and all the thousand ills that flesh is heir to. I say, designedly, "that flesh is heir to," because I am now speaking of bodily ailment only, and affirm that this kind of causation of malady is peculiar to man, and that we lose sight of much which it behoves us to consider if we fail to see the broad line of distinction, which, in this particular, separates him from the animal kingdom, to which he is allied.

Again, the inferences that have been drawn from observations on animals with regard to the phenomena of diseases apparently common to those animals and to man, have, I think, been pushed too far, and have led to much unintelligible controversy. The differences between the human and the animal organisation have sometimes been lost sight of, although many of them are obvious enough. Variola and vaccinia afford a striking illustration of my meaning, when we remember their different relations to infection and inoculation, and the curious effects which are produced by the passage of either of these poisons through the human body, or through that of the cow. This is but one of many examples that might be given of the necessity for the inoculation of poison from the animal world, if we would infect the human being with its virus; and there are others which show that the ordinary mode of transmission from animal to animal is restricted to special groups of animals, and does not apply to man.

Still further, the very interesting observations that have been made with regard to the inoculation of tubercle exhibit another striking difference between man and those rodentia upon which the experiments have been made in the greatest number. I allude to the freedom of the brain-membranes from the effects of the general infection. We may speculate upon the causes of such a difference; and it matters little for my purpose whether or no the greater development and activity of the human brain should determine its proclivity to suffer from tuberculisation of its meninges. That such difference does exist is a well-known fact, and points to a still greater and wider difference which we should not ignore. Again, the action of many familiar drugs upon the most familiar animals is so different from that which we know to occur in man, that therapeutic experiments upon the former should be received with much more than "one grain of salt" when they are put forward as our guides in the treatment of human malady. If mercury fail to increase the biliary secretion of dogs, and if opium causes diarrhœa in those our delightful companions, we are not justified in the inference that "blue pill" is useless in some forms of so-called "bilious headache" in the man, and that opium is valueless in some forms of human diarrhœa.

To pass, however, from these physical ailments, to those which show themselves in disturbance of the higher faculties of man, let me remind you of another great distinction of man from the members of the animal kingdom in his exhibition of a form of malady, or rather many forms of malady, from which they are happily exempt. Something very like epilepsy occurs in dogs, in horses, and in domesticated birds, and it may be artificially produced in the rodentia. Something like the stupidity and waywardness of man may be seen in our domesticated friends—they exhibit sometimes, as it has been said, "a disobedience almost human;" but the curious and complicated phenomena of insanity have never, so far as I know, been observed in the lower animals. We may see in them the delirium of fever, the hallucinations of commencing rabies, the irritability of advancing years or of premature decay—the outcome of forced luxuriousness, that antedates the fretfulness of age; we may find them stupid and long-lived, or precocious, clever, affectionate, impulsive, and so possessed of faculties that would make us apply to them, and in an enlarged sense, the old adage, that "those whom the gods (and not only the gods, but men) love, die young;" we see them weakened in body and in mind, but we do not see in them "insanity," *i.e.*, in any of the more striking forms in which it presents itself to the physician, whose business it is to deal with human beings.

This distinction, which adds to the many other helps that we may derive from the animal kingdom, seems to me to be of great value when we are attempting to show the difference between man and those creatures to which he may bear the closest physical and intellectual relationship. It is so, not only in regard to the lower corporal distinctions that may be traced, but in respect of that which affects man in his highest relations, his mental and moral capacities for exertion, and also, unhappily, for disease.

We cannot pay too high a regard to all the conditions which conduce to physical health; but I am sure that we shall lose much, of quite inestimable value, if we regard these only, and look to an infant, a growing child, a youth, or an adult, as a mere animal to be trained, for this work or for that, just as we might train, or "break" in, a dog or horse, and neglect those other elements in his higher training or education, which have no direct relation to those lower phases of life, but which are an integral part of his development, and essential to his fitness for the position for which, by the nature of his constitution as man, he is created.

All that I have already said upon the neglect and value of subjective symptoms of disease might be recapitulated here, and urged with augmented force; for it is obvious that we must depend entirely, in many cases, for our knowledge of the phenomena of disease upon that which reaches us through the mind and the words of our patients. Gestures, screamings, inarticulate sounds, interjections—articulate or not—and, perhaps, some expressions of the face, may be ranked with objective symptoms of disease or suffering. It is not to these that I refer, but to those symptoms which require the consciousness of man for their existence, the intellect and speech of man for their conveyance to another. There are forms of disease the earliest and sometimes the sole indications of which are of this sort. If they depend upon material changes in the cerebral centres, or in other portions of the nervous system—as in all probability they do—they are yet revealed only in the effects of such change on the consciousness of man, and in his power to convey the idea of his personal suffering to the mind of his fellow creature. We do not understand the many and marvellous modes of communication between different members of the same species of animals; but we can observe them, and see that they are unlike our own. If we would understand our patient—a human being—we must listen to what he can tell us of himself; and I cannot but believe that, if we would so regard the ills and sufferings of man as to endeavour to assuage them, we must deliver ourselves from notions, however plausible, and from theories, no matter how clever, which reduce man to the level of "the beasts that perish." Whilst we refuse to be led astray by old-fashioned dogmata that would ignore his relation to the animal world, and his possession of qualities which in no sense differ from those which we see in the donkey, dog, or horse, we should not fail to recognise in him faculties which they do not possess, and which may be the fruitful source of disease; powers in him to which they show only the faintest resemblance, but which, in him, may constitute by their derangement the misery of life; and modes of treatment which can only be successful by the fact of their basis being the belief in the fact of manhood.

At every period of life, of human life, we may often see much that is purely instinctive relegated to a higher sphere of motion, and may, in cynical mood, sometimes say about the youth—

> "'Twas strange that one so young should thus concern
> His brain about the action of the sky:
> If *you* think 'twas philosophy that this did,
> *I* can't help thinking puberty assisted."

But I am sure that we shall do our work the better, if we come out of and above this lower ground, and recognise in the suffering man the fact of qualities which transcend all that we know of the mere animal life; see in him a sense of duty and of self-sacrifice, an outlook to the future and to the unseen, a weariness of the merely temporal, and a belief in the eternal, that shall lift him into the region of our personal sympathies, and out of those simply physical ranges of action which we recognise in cats and dogs. There may be much to disturb his appreciation of the two worlds to which he feels himself to belong, much to make him sometimes cling tenaciously and blindly to the "seen," or much to urge him onwards in an equally blind pressing towards, or absorption in, the "unseen," or much that makes him incapable of appreciating the reality of either; but still, as we look at man, in his misery, shadowed over with doubts, and hindered by fears, quailing before imaginary ills, or exulting in fictitious joys, we can pity him, feel for him, try to help him, wonder at him, fail to understand him, but we cannot despise him; we cannot thrust him down to the level of the brute, but rather ask ourselves in deep sorrow, or in deeper joy—

> "Though world on world in myriad myriads roll
> Round us, each with different powers
> And other forms of life than ours,
> What know we greater than the soul?"

3. The next point to which I wish to direct attention is

the belief in "individuality;" the influence which this belief has exerted in the past, and still exerts in the present history of pathology; and also the effect which a disbelief in the individuality of each human being seems likely to effect on the future of our science and art.

Our forefathers, and indeed many of our collateral relations in the brotherhood of our profession, did, and do still, cling to the persuasion that, although there may be much similarity between all the members of what we call the "human family," or "human race," there is to be found between each member of that race, and every other, a difference, which, not only for the sake of the individual, but for the purpose of complete scientific investigation, overrides the generic resemblance, so that every man, woman, and child presents for investigation and treatment a personal and a family history which we should be unwise to ignore. To have known the individual from his birth, or to have "brought him into the world," as the somewhat arrogant but time-honoured phraseology runs; to have known his parents and his family, and to have watched his childhood, youth, and manhood, were conditions which were held, and are still held, to be important elements in the probability of correctness in a physician's diagnosis, prognosis, and treatment of the case that comes before him. And surely there is something to be said upon the value of such knowledge. But I think that it has been heretofore often overrated, and that now it is in danger of being underrated. So long as, and wherever, such knowledge was the excuse for ignorance of general pathological laws, or the cover for carelessness in the examination of the patient, it was evidently wrong, and abundantly productive of false notions and mischievous treatment. It was an injustice to the individual, and an injury to the practitioner. But let me ask if we are wise in ignoring all information of this sort? Whether we may not learn much from the family history and the idiosyncrasies of many, which would be utterly passed by except for such accidents of professional information? Whether or no we would not sometimes trust ourselves, in our own sufferings, to some one who knew us well, and had known us long; who knew our parents and our belongings, and who, with no special skill in the use of many implements whose names may end with "scope," hit out some common-sense line of treatment, the result of much experience and far-seeing, rather than commit ourselves to the care of the most highly trained graduate in medicine, who could see our retinæ, trace our pulse, qualitatively and quantitatively examine our excreta, record our temperature, and bring to bear upon our case the last generalisation of the latest writer on our peculiar malady? I think that we should, or at all events that we should like to combine, if we could, the guidance from both sources; we should be glad to know all that our younger acquaintance could teach us, but we should also like to fall back upon the knowledge and wisdom of our older friend.

That which has conduced the most powerfully to a disregard of personality and idiosyncrasy in the study of disease, is the prevalent adoption of the statistical or numerical method in the processes of pathological investigation. No one can appreciate more highly than I do the value of that method, but I think we have often missed the point of its teaching, and misapplied the real aids to be derived from it in the treatment of disease. Statistics are eminently useful for the destruction of hasty and erroneous generalisations; by their aid, and often by such aid alone, we can prove that certain currently received dogmata are wrong. But it often happens that "one fact, well observed, is worth (not only) a cart-load of opinions," but is equal to many folios of statistical inferences, calculated to any number of decimal points. The value of statistics in pathology is in proportion, first, to the approximate identity of the several cases with which the inquirer has to deal; and then, secondly, to the number of the cases exhibiting such nearness of resemblance. When the former element, the resemblance of cases, is disregarded, no matter how wide the area from which the results have been derived, we have learned some curiosities of arithmetic, but nothing of real scientific value in pathology. When the latter element, the extent of the area of observation, is forgotten, we may have acquired some amusing learned lumber; but we obtain little that can be of real service in our attempt to grapple with the multitudinous variations of disease in so complete a being as man. At the best, our knowledge is but a fraction of the truth we want to know, and statistics do but tell us what that fraction is. But where, as it seems to me, our frequent mistake lies is in the fact that we regard this definite fraction wrongly in giving to it a positive and substantive value, whereas we should look to the other side, the often much larger fraction, that represents the unknown, unexplained, and unreduced facts of medicine, and apply all our energies to their solution. An illustration may make my meaning clearer. In applying the results of statistics to the etiology of a particular case—it matters not of what disease—we say, *e.g.*, that in 25 per cent. there is an hereditary taint, and we fall back upon the idea that the chances are as one to three that the disease was, in this particular instance, inherited, and so we sometimes content ourselves with such assumption, and seek for no other causation. Further, it may be within our personal knowledge that the patient's father suffered from a like affection, and so no other explanation seems necessary, and we do not seek for it. But let me ask whether, if in 75 per cent. of all cases of a particular malady no hereditary taint could be discovered, we are right in putting the chances of heredity at so high a point as one to three in any particular instance? If in 75 per cent. the disease had originated spontaneously, or apart from hereditary taint, it might do so, and probably has done so, in some of those twenty-five in whom hereditary taint has been shown to be possible. On purely arithmetical grounds, we ought to say that in only one-fourth of the twenty-five could there be an antecedent probability of family transmission of the disease. This would reduce the etiologic value of our statistical knowledge of heredity in this disease to less than 6 per cent. Then let me ask whether or no our duty is not to examine more carefully the other cases, those 75, or more properly 94, per cent., in whom we have no reason to believe in this mode of causation? But still further, whether or no we have not sometimes quietly put aside any investigation of such sort, when the bare fact of the existence of a like disease has presented itself in a near relation of the patient, who is confided to our care? The probabilities are as ninety-four to six against an hereditary origin, but we give our patient anything but the benefit of the doubt, and frame our etiology, diagnosis, prognosis, and treatment upon an hypothesis which presents ninety-four to six chances against its being correct.

I have selected this example of hereditary taint, and have reduced its value to a minimum, because it rather militates against the view that I wish to enforce of the importance of a knowledge of family history, and still more of individual character; but a similar line of argument might be employed to show the exceeding vagueness of our knowledge, derived from statistics, with regard to other etiological conditions of a very large number of diseases, and the urgent necessity that exists for careful examination of each individual case, as to the origin of the malady which may bring it before our notice, and of the extreme danger which attends the propensity to fall back upon numerical statements.

Our daily and hourly work is with individuals, and I cannot but think that, so far as regards the comprehension of their diseases and their needs, statistical pathology has afforded us no other aid than the elimination of much currently received opinion. This has a real and obvious value; and it is in this destruction of error, and not in the construction of the science of medicine, that the numerical method finds its *rôle*.

Again, it is curious and interesting to know—as we do pretty accurately—how many people in 1875 will be killed by railway accidents; how many will break their legs in hansom cabs; how many will drink sulphuric acid; how many will be burned to death; how many will die of phthisis and carcinoma; and how many octogenarians will marry young girls under twenty years of age. But when we have obtained this knowledge, so curious, and yet so precise, let me ask, of what value is this to you or me, or any of our patients, who may be starting on a railway journey, hailing a hansom, using sulphuric acid, shutting off our gas at night, exposing ourselves to cold or worry, or advancing in years to the fourscore, which, on high authority, is said to be but "labour and sorrow?" So far as I can see, the value is inappreciable, for life is too complex in each individual for the application of many general laws; and, least of all, for the deductive use of those which are derived from a mere regard to numbers.

By statistical formulæ we may insure lives, so as to benefit the survivors, and protect shareholders; but we can use them only in their application to the many; they are of no pathological significance to the individual. That one man is accepted at ordinary rates, and that another has to pay an addition of 20 per cent. to his premium, may be a useful arrangement for the office, which deals with masses; but it affords no guarantee that the former may not die of fever within a month, or that the latter may not outlive all those who had no drawbacks to their claims. And here, let me say, that a practice somewhat common in insurance offices may, I think, lead to some serious discomfiture hereafter. I mean one which seems very natural, viz., that of making an addition to the premium for insurance of a faulty life, to be removed, if, after five, seven, or ten years, on re-examination, the proponent is in good health. This is done with a kindly feeling of regard to the individual, but not on an established basis of statistical knowledge; and the two elements, of judgment of the probable future of the individual on the one hand, and the requirements of the office on the other, are somewhat jumbled together; and so we, as physicians and advisers, are stepping out of the known lines of average probability for the many into the vague territory of knowledge of the individual with regard to whose personal and peculiar chances of viability we know little, or next to nothing.

Perhaps there is nothing which marks more distinctly the individual peculiarities of people than the relations which they bear to external agencies—material and immaterial; such as light, heat, electricity, food, and drugs. We call these peculiarities, idiosyncrasies; we meet with some of them two or three or more times in twenty years, but others are so rare that a long life of varied and wide experience may have witnessed but one example. Some people are most delicate electrometers and magnetometers; and I know one such who became blind in a thunderstorm eight years ago, and whose physical frame before and since that time is always contorted by electrical and magnetic disturbances long before the former are recognised by ordinary people, and when the latter have only been displayed by perturbations of the machinery for electric telegraphy. We may all possess properties which are influenced by such conditions; but they are affected to only such a slight degree that the existence of such sensitiveness as that which I have mentioned must be regarded as individual. Again, peculiarities with regard to food furnish another example of the same distinction. One person cannot take egg, in any shape or form; to another tea and coffee are poisons; some cannot eat flat-fish; others are put into cutaneous tortures by strawberries. And so with drugs: ipecacuanha will make some sneeze, a grain of iodide of potassium will iodise one person, a grain of grey powder will salivate another, opium will produce colic in a third, and so on. In the face of facts such as these, it behoves us to regard each individual member of the human family as at present, and at all events for pathological and therapeutical purposes, unexplained and often untouched by those general statements, or so-called statistical laws, which we have been able to frame with regard to the behaviour of the race.

We speak of dentition troubles, of all the morbid tendencies which accompany the several epochs of life, of the surgical operations that may be undergone, of the diseases that are prevalent at this age and at that; and, indeed, sometimes of the end of it all in death, in such way that one is reminded of the comfort taken to him or herself by that very clever person who moralised upon the post-mortem, or perhaps not always post-mortem, treatment of the eel! "Custom hath made it in him a property of easiness" may sometimes be said of the physician or the surgeon, as well as of the grave-digger who sang over his ghastly toil, and also of the astute fish-fag, who failed to recognise the individuality of the eel, upon whom was being performed the last tender office of removing its cutaneous envelope.

Daily experience teaches us that each case, or rather that each man and woman, must be examined for himself and herself; and that nothing short of a knowledge of the individual will be of real service to us if we would understand and treat disease. We are all of us alike, yet we are all dissimilar. Each of us has for himself to go through but once the stages of development that are common to us all. Each individual life is continuous, and passes onwards, and alone, through growth to maturity and decay. No one can keep with us; no one can enter into all the mysterious windings of our intellectual and moral being; no one can do more than share our troubles and our joys; no one can take them from us; the sympathy and the love that help us to bear them, and which we so fondly cherish, do not render us less alone; and as we reach this epoch or that period of our existence, and find ourselves floating, drifting, or manfully pushing onwards upon the rivers and over the depths and shoals of time, and which we know that our fathers have passed through before, we cannot help, each in our individual consciousness—in spite of statistical law, of bold generalisation and *reductio ad absurdum* of all preconceived opinion—we cannot, any one of us, help feeling, as we come to one or many of them, as if

"We were the first that ever burst
Into that silent sea."

4. And now I come to the last point that I wish to bring before you—viz., the Individuality or Speciality of Disease. These words do not fully convey my meaning, and yet I know not any others which would serve my purpose better. By illustration, however, I trust that what I mean may be made apparent. The chronic wasting diseases with which we are all painfully familiar—such as tubercle, cancer, rickets, Bright's disease, Addison's disease, gout, and the like—present many

points of resemblance *inter se.* They have symptoms in common; many of their accompaniments or intercurrent phenomena are identical; there is much that is common to their modes of termination, and much that is alike in their anatomical appearances. We know, with some approximation to precision, the commoner sequence of events in each of them; can sometimes explain something of their causation; and can predict, in general terms, their future. An enlarged view of the living bodily functions, and a more careful and extended examination of the organs and tissues after death have shown a far wider range of physical alteration than that which was believed to exist in many of the diseases to which definite names were given in days gone by. Microscopic analysis, becoming finer and more exact, has revealed such a notable resemblance or identity in the ultimate facts of structure-change in many diseases, that the accomplished pathologist may fail to describe or even see their difference, while their rougher features have enabled even the tyro to put them at once into this category or into that. And so there has grown up a tendency to sweep away distinctions and names which were the delight of our forefathers; to disbelieve in the existence of so-called constitutional disease; and to refer all the changes of tissue to the accidental operation of local interferences with nutrition. There is much to be said in favour of a reconsideration of all old distinctions, and of the names by which they may have become familiar. It is by no means necessary, for example, that the kidney should be always involved in those degenerative processes that may fairly be called "Bright's disease." It is not essential that the supra-renal capsule should be affected in a cachexia that well deserves the name of "morbus Addisonii." It is not constantly found that the ligamentous and cartilaginous tissues of a joint are affected by a special inflammation in one whose antecedents and symptoms warrant the application of the term "gout" to the malady from which he suffers. But I think we should be going far wrong if, in regarding either the variety, the resemblance, or the wide extent of symptoms, we lost sight of the individuality of that which underlies those symptoms, *i.e.*, of some central fact, property, force, element, or tendency which finds expression in the special grouping of phenomena or symptoms. There is something that is wrong in the organism of A., and which is radically and essentially different from another something that is wrong in the organism of B., when the one presents tubercular disease and the other cancer. We do not know what that something is, nor does it seem to me that we do more than approximate a knowledge of the direction in which we should look and work in order to find it out.

We know very much of the general order of events, of the relative frequency with which this organ and that is found involved in tubercular, cancerous, or other cachexiæ; but as to the determining causes of such differences of proclivity in the affection of particular organs, we know next to nothing. They are at present ultimate facts of science; and they are like to those which pertain with regard to the acute specific diseases. With respect to them, we know that scarlet fever affects the throat, the skin, and the kidneys in a particular manner; that the poisons of measles, of typhoid, and of other exanthemata exhibit another form and order of infection; but as to the reason for these facts in their history we know nothing. We fall back in regarding the latter—the acute specific diseases—upon the individuality of the poison that is brought into the body from outside; with regard to the former—the chronic and constitutional maladies—we must, I think, adopt a similar process of thought, and recognise a speciality or individuality in that which determines the starting-point and subsequent career of their morbid changes. It seems to me that the further we carry our knowledge of the intimate detail of structural alteration, the further do we carry ourselves away from the discovery of the missing link. Diagnosis may often be as easy as it is possible to conceive up to the point of recognising some diseases, to which we may give a name that is useful for the purposes of recognition; but we are only on the threshold of inquiry as to the whole pathology and etiology of those affections, or, in other words, their complete diagnosis.

With regard to many diseases, we are in a position that might be described as somewhat like that of the physiologist and the school-boy in combination, when they have found two birds' nests. The one—the histologist—shall examine the contents of one of the eggs of each nest, and apply all his microscopical powers on the cells that he shall find: he may call the chemist to his aid, and yet fail to give, after the most searching gaze and chemical analysis, even a guess as to the nature of the bird that would be developed by the simple application of warmth to another egg which he has not broken. The other—the school-boy—looks at the shell, and decides in a moment that this will become a blackbird, and that the other will produce a lark. What the relation may be between the colour and the marking of the shells and the wonderful constitution of their contents that shall determine the development of this bird or of that we do not know. What is the difference between their contents we do not know, but let us remember that a quite specific and wide difference does exist between them, although it is far too fine for any of our processes of investigation to demonstrate its nature; and yet that a correct distinction may be made by observation of the character of certain superficial phenomena which we can in no way connect with the essence of the difference. If we apply this illustration to the diagnosis of disease, we see that the pathologist sometimes ignores the existence of difference which he cannot apprehend; misses his true line of work, which lies often in another and as yet unconsidered direction; while the practical man solves the question at a glance. The difference really exists, but it is by its outcome, in the modification of life-functions, that we really make our diagnosis of disease; and by regard to these, I think we are driven to a belief in the individuality of special ailments.

While we are perhaps losing way rather than making advance in our knowledge of some classes of disease, by the endeavour to get rid of their individuality, there is, at the same time, a tendency to over-refinement of specialisation and nomenclature in regard of other classes. Such terms as "locomotor ataxy," "Cruveilhier's atrophy," and the like, may be very useful if they but direct attention to the lines along which degenerative changes in the nervous centres are apt to run; but if there is attached to them the kind of importance which we sometimes find they have received, we wander, I think, from the true path of scientific investigation, and are led to separate from one another maladies which are much more closely allied in their real nature than the difference of their names would warrant us in supposing. There is an individuality in these, but let it not be over-estimated; there must be something which determines why this tract or that of fibres in the spinal marrow shall be the starting-point of morbid process or decay; but the conditions which lead to these differences have not yet been made out, and there are many so-called causes of disease which are common to them all. What I think, then, that we should do is, bearing in mind the individuality of disease, search into all its phenomena, nor rest satisfied with those which seem the most relevant and the most consistent with the present modes of physiological thought, and the ascertained facts of pathological research; but pass beyond them into the outlying regions of vital phenomena, and perhaps discover in them (*i.e.*, in some apparently irrelevant facts) the clue to a solution of their mystery.

In recapitulation, let me remind you—(1.) that by losing sight of, or underrating the primary fact of life, we deprive ourselves (*a*) of the information to be gained from a study of subjective symptoms; (*b*) we often misdirect our therapeutic efforts, by eliciting vital action, rather than by conserving vital force; and (*c*) lose sight of many of the most important causes of disease. (2.) That by failing to see the speciality of the nature of man, we underrate or ignore (*a*) much of the etiology of human suffering; (*b*) are often misled by the results of observations upon animals; and (*c*) are in danger of misinterpreting the facts of the most serious maladies that may afflict our fellow-creatures. (3.) That by disregarding the individuality of man, we are in danger (*a*) of again and in another way losing a due appreciation of the causation of disease; and (*b*) of overrating the value of statistics, and of being led astray by their apparent precision, which exists only with regard to masses; and (4.) That by an unsound application of the idea of the specificity of disease, we may, on the one hand, (*a*) sweep away distinctions which are facts of pathology, and, on the other, (*b*) raise up or lay down lines of demarcation which are unreal.

From what I have said, it is, I think, obvious that the science of medicine is in a state of "change" as well as of "progress." It has not yet arrived at the degree of exactness which may be found in the simpler sciences; but those who are devoting themselves to its pursuit are pressing towards that end; and each is endeavouring so to throw his mite into the treasury of knowledge, that a scientific ordination of the facts of pathology may hereafter be a possibility. But the facts are so diverse in kind, so varied in appearance, and so bewildering in their complexity of form, that we must wait, and perhaps wait long, for their due arrangement. Thousands of observed facts lie as yet hidden in the valuable but unrecorded experience of those who are daily adding to the unwritten lore of medicine. We gather scraps of them in conversation and in consultation; we may often see something of their influence upon the habit of thought and of practice of those whose large stores of information have not as yet been exposed to view, and which have not as yet been sorted for personal use. But a true science of pathology cannot be, until the knowledge of all individual workers is the common property of all. In the meantime we must "learn to labour and to wait;" and we must least of all commit ourselves to any particular school or line of thought, but rather cultivate that habit of mind which has "a look southwards, and is open to the whole noon of nature."

Those who are the workers in this wide field are not all in one "stage," as it has been termed, of scientific inquiry. We are not all of us in either the "theological," "metaphysical," or "positive" stage of thinking with regard to our relationship to the facts and forces around us. Very few individuals who have seen much, thought much, and felt much are so limited with regard to the sum total of their experiences as to assert even for themselves a position—an exactly limited position—

on either one of those three platforms. But each one has his bias or tendency of thought; and the work that each does, and the results to which such work tends are greatly influenced by such underlying and directing force. I have endeavoured to show the effect which, as it seems to me, may be produced by an over-attachment to one line of investigation, and by a neglect of another, the results of the pursuit of which the student of man can ill afford to lose.

In our recognition of the *Speciality of Disease*, we have carefully to examine the nature, and the sources whence they come, of all the contaminations by which the stream of life may be damaged or defiled. They may be puzzling, hard to separate, and still harder to trace to their source. They may be complicated in their effects, and so mixed together that again and again we may be baffled in our attempts at their analysis. But what we want is work, not on any preconceived theory, but work that shall faithfully follow onwards and trace backwards the line of sequence of events, and eventually yield, as it has done before, a real knowledge of the facts we wish to know.

Again, with regard to the *Individuality of Man*, we must strive to show whence each life has come; the nature of its source; the conditions of its youth; the struggles of its onward progress; the valleys through which it has passed, and the rocks it has had "to overleap or rend." We may often be perplexed in our attempt to solve the problem it presents, but we must accept the facts of their existence, and of their variety. We see a quiet onward flow in the course of one, and a stormy, labouring, toilsome course in another. One seems like a river wandering through valleys in which children play, and upon whose banks age reposes; untroubled by the oar, unhindered by the wheel; and sometimes in deep places, seeming to be at rest, but still passing, although gently, onwards, without sound or ripple, to the far-off sea. Another life-stream comes from its rocky home, dashes hither and thither, in what seems its wayward youth; but gathers strength as it flows on, and does mighty work, setting in motion a thousand busy looms; bearing on its broad breast the light craft of idlers, and also the dark, heavy burthen of outlying toil; working and carrying still onwards the labours of a thousand lives, through quiet valley or through noisy town, until it, too, finds its home. We must know all that makes up individual life, if we would understand its ills. We must go back to its source, and look around at all through which it has had but to pass, or to work its way, if we would know how to understand or avert the troubles it may meet.

And again, with regard to *Man*, it is not until we recognise in him his true relation to the world that lies around him—which in many of its forms of life comes so near, but which is yet so far removed from him in his higher phases—that we shall duly understand his sorrows or whence they come, in such way as to prevent them or relieve them when they are thickly hedging him about.

And, lastly, we must duly appreciate the great fact of *Life*—the mystery of mysteries—that underlies all our knowing, and over-arches us, with sometimes an abyss of light, sometimes an impenetrable gloom. When we try to realise it, we seem to be—for we ourselves are a part thereof—on the surface of a boundless ocean; above us the sky, now dark with cloud or rent by storm; now lit with sunbeams, or trembling with the pale light of stars; beneath us a mighty deep, with its unknown treasures, mysterious currents, and sense of unfathomable danger. Sometimes we "see the light and whence it flows," "we see it in our joy." Sometimes we see the land, and press towards it; but, again, the night comes down, the horizon line is lost, we are poised between two worlds, and, although we may strain our eyes to see, and our ears to hear, we may find no token to tell us of the points in which they meet, no glimmer of the unseen things that sever them.

But let us thank God that we are not left alone, and that in such darkness there often arises light; for, often when most sorely troubled with the surrounding mystery—the abiding mystery—that shrouds the details of our knowledge of both man and life, we find in our own consciousness, our thoughts, and feelings, that which may enable us to help our fellow in his sorrows, relieve him in his sufferings and fears, and banish from his mind and heart the clouds that may sometimes have gathered, so darkly, around our own. And, having this sympathy, and holding in our recollection and present thought those phases of our own and of other lives—which we know full well, but which we cannot reduce to words—we shall be the better fitted to explore and unravel the whole series of phenomena which present themselves in the lower ranges of pathological investigation. The method of such physical research, as well as its results, will check us when we may be disposed to drift away into the mist or to soar into the clouds, will help us to cultivate exactness in all directions of inquiry, and so contribute to the science and art of medicine, which, in spite of all its failures, misdirections, and missing links, is yet one of the greatest boons that man has been the means of conferring upon man, and which, we believe, will in the future far transcend, in its benefits to mankind, all that we have known of its doings in the past.

AN ADDRESS

Delivered before the Students' Christian Association, June 15th, 1876.

THERE are many uses in this Association. Unhappily, we know the contagion of evil: happily, we also know the comfort of good companionship. I use the word "comfort" in its old sense of strength from association. Doubt, fear, terror, or something bordering on despair, in an individual, may be removed or over-ridden by contact with another, who has overcome his doubt, driven away his fear, mastered his terror, and been delivered from anything that verged towards despair. The strong conviction of an honest man, expressed in regard to a fact of science, a principle or process in art, an interpretation of history, in a religious belief, or in a line of action, does convey, as I think it ought to do, help to another, who may be in difficulty, doubt, or distress with regard to any one of those ranges of his thought, feeling, or conduct.

There is, at the present day, much to bewilder as well as to direct thought, much to awaken questionings which cannot as yet be answered, much to raise doubts which cannot as yet be removed; and individuals are often saddened, and sometimes carried into something like hopelessness, if they are introspective, live much alone, and have little or no association with their friends. A society like this supplies an urgent need; you help one another; the strength of conviction of the strong is given to the weak; and one who, when alone, may have felt gloomy and despairing, is lighted up into actual joy, by finding that others believe and trust in something, which, in his solitude, he could not realise. No one, I take it, will doubt the truth of what I have said, and of its especial application to religious faith. History teaches us that all kinds of beliefs and faiths have been strengthened in the way that I have mentioned ; but the questions that must arise are, whether a belief that needs or leans on such external support is of any value ; whether its existence is not a mere emotion, which may run into a sort of hysteria of the soul ; or whether, from this fact of belief, strengthened by association, there is evidence of the existence of a something, which (admitted to be an essential element in what we call a religion, a "religio," a binding together of individuals for a common purpose) is a fact the scientific observer should recognise, and to which he should ascribe its proper value?

For myself, I reply to the last query in the affirmative. The scientific observer should observe this fact, and give to it a value which has not yet been given. One of the greatest teachers of the age, in lampooning universal suffrage, says : "A nation once voted by an overwhelming majority 'Not this man, but Barabbas!'" and then proceeded to show what happened to that nation. And I am prepared to admit that coincidence of feeling or opinion in a multitude is not always a proof that the feeling or opinion is right. But I do say this, that concurrence of opinion is the only widely applicable test of either truth, or of right and wrong : and this is the principle upon which all the justice of England is administered in its trial by jury, and the principle upon which all the Government of this country is maintained. Ridiculous and contemptible as it may be that X. gains his seat by three votes over Y.: absurd as it may sometimes seem that a Bill loses its second reading by a minority of five, yet we Englishmen bow to the Majority, quantitatively as well as qualitatively admit, that is, the value of concurrence of opinion ; act upon it in every club, from the boys' club in poor neighbourhoods to the highest in Pall-Mall ; act on it in University and Board ; and yet say, as some do, that it is of no value in religious matters. In these respects the recognition of the *vox populi* is all fanaticism, ignorance or folly. It does not matter that millions of people have held this or that belief: people can believe any folly any fiction ; the larger the number, the greater is the improbability of its truth. I do not agree with this disregard of the belief of the many. To my mind it is of great value as a test of truth ; and as the belief of the individual is strengthened by the belief of those about him, a society like this is of great service.

A second use of a society like this seems to me to be, that it gives to you an opportunity of helping one another, by expressing directly to those about you the honest convictions at which any one of you may have arrived, with regard to some of the most serious questions we can ask. I use the word "questions" advisedly, because there is much that is questioned in our faith ; and it is well for you, and for me, to know what answers you and I can give to these questions. You may help one another much by facing them, and carefully discussing them. On this point, let me urge upon you—first, never to say, or even assent to, a proposition or dogma that you do not really, and for yourself, believe ; and, secondly, not to fall into a worse and weaker error—that of affecting and parading clever doubts. Unbelief is bad enough ; but the affectation of it is a thousandfold worse. The former may be the sorrowful, but still hopeful, state of one who is true and honest ; the other is the more sorrowful and less hopeful state of one who is not true, and does not know what earnestness can mean.

Have no fear of facts, have no fear of truth, however it may seem to conflict with your own experience or with testimony. Do not push aside an awkward question because you cannot answer it, there and then. Think and pray ; and, if afterwards, you have no answer to give, say so honestly, and wait till you know more, or have felt more, and have found the answer.

Again ; do not think that you are set for the "defence of the Truth." As a great friend of mine has said, "Be yourselves true, and the Truth will defend you." If you meet with a fact of science or history that conflicts with recognised notions, long-established dogmas, and widely spread beliefs, ascertain the nature of that fact. Be satisfied that you are not dealing with charlatans or quacks, who may give you messages through table-rappings or on slates; but be sure of your facts, and then do not fear them. What is true is of God, and you will find its real bearings on other things that are true, if you work and wait.

Propositions that we formulate for ourselves may seem to contradict each other, or may do so; but, remember, propositions are not facts, but simply our way of looking at, or representing our notions of facts, or of something that may not be fact; and here, let me say, that it must be that you meet with such conflict. But be not dismayed; be sure of your fact and hold it fast; and again I say, work and wait. We may, and often are, placed in the condition of thought in which we say, "One of two propositions must be true:" for example, matter is infinitely divisible, or it is not; we can conceive no other idea; God is omnipotent, or man is free, and we may ask ourselves on which side we will place our creed; but it seems to me that we are not yet in a position to make these bold assertions and alternatives, for there may be some discovery made to-morrow which shall show a real exit from the difficulty. And so again I say, work, and wait, and trust. You may be toiling in the dark night of doubt, and be tossed by many a rough wave, and distracted by many a rough wind; you may see nothing above you, or below; you may and must toil on, though the wind seems contrary, and there is, in the starless sky, and in the heaving of the unseen waves, the sense of unfathomable danger. But be ready, keep your minds and hearts open to the approach of Truth; and it may come to you, will come to you, sometimes not until the fourth watch of the night, in the darkest hour before the dawn, and it may be in a form you have the least expected; and you may "cry out for fear;" but be steadfast, and out of that darkness will come to you the voice, "It is I; be not afraid;" and, if you trust it, you too, may walk upon those waves; if you doubt it, you will sink; but even then, the hand that helped Peter may, nay, will help you, and the sorrowful question, "Wherefore didst thou doubt?" may not be answered by you; but you will find the storm has passed away, the strange apparition was the Friend of friends, and you have reached the shore in peace.

Truth often comes as a "stranger," but be not unmindful to entertain strangers, for thereby some have entertained angels unawares.

A third use of this association lies in its catholicity. You sweep away, while you pray and think and work together, some of those dividing lines which often separate men from one another. It is, I think, a thing not to be deprecated, but rather a fact to thank God for, but there are differences in Christian creeds and practices. If we were all cast from the same mould, we should know neither ourselves nor our friends. It is not so, there is resemblance, but there is difference; we are made in the "image of God," but yet we are individuals. Often the controversy about little things has prevented men from union in work for higher aims. This is to be lamented and overruled; and an association like this helps to attain that end. You meet to help one another in living the life that God would have you to live; not in fussing over baptism by immersion or affusion; not in discussing transubstantiation, consubstantiation, or any other "ation;" not in bickering between church and chapel;—but for the purpose of strengthening your belief and comforting one another in the daily habit of holy living.

Many questions that it may be quite right to discuss elsewhere, and even fight for elsewhere, are not those with which you are concerned. You need the help of mutual contact to enable you to answer questions far deeper than these. The science of to-day is doing, very sharply, what it has done before—it is laying the axe to the root of the tree. It is asking such questions as these: Is there a God; Is there an after state of existence, when we have "shuffled off this mortal coil?" Is man an immortal being or is he not? Is there any right, or any wrong? Are we responsible beings? And if so to whom? Is our responsibility only to one another, and to society, or is it to a God who made us, and who judges us now, and will judge us hereafter? Is the Bible a good book of maxims made by man, or has it an authority that is above man's teaching?

An association like this may help you much, and in this way—by helping you to over-ride many difficulties by the sheer force of belief that is strengthened by mutual conviction. Now and again some new fact appears in science, which might throw discredit upon old and well-established dogma, and you might be led to doubt, say, the circulation of the blood. But there is a mass of fact upon which that doctrine is based enabling you to say, "This new theory may adequately express certain facts, yet it does not alter my conviction as to the general truth to which it seems opposed; the mass of evidence is such that this curious discovery, or this clever way of putting the case, does not drive me from my old position. I must see how it may be reconciled with that which I have held." The weight of evidence and the impetus of thought so gained, carry you over the difficulty, and you hold to your well-formed belief; and it may help you much to know that others are with you in your scientific creed.

That which is true in science is true in regard to religious faith. There may be, and often are, facts which seem to shake that faith; difficulties which seem insuperable. You may question this miracle, or that statement in the Bible; you may meet with facts that seem to contradict each other, or the Bible; but let me ask you, does not the whole weight of evidence, and the impetus of its grand motor force, carry you over passages that you may not understand, over events of life that you may not witness, and enable you to say, I cannot make this out,—this queer text, this inexplicable passage, this strange reversal of all that I should have thought wise and good,—but it is a mere trifle when taken in comparison with the great facts of consciousness, of history and tradition, and so I work and wait. Each individual must often do that for himself; but an association like this gives a vast amount of force to the movement of thought and feeling that might, when alone, be faint and fearful. You may fight bravely single-handed, but you fight more strongly when surrounded by those who have the same end at heart, the same belief in head, and the same readiness to do or die.

Again, there is now much modern "scientism" rather than science, a morbid condition of both mental and moral nature, which is exerting, as I think, a mischievous influence upon the lives and hopes of men. It shows itself in this way, in attaching exaggerated importance to anything or any fact which may be weighed, measured, multiplied, smelt, seen, handled or otherwise treated, by the senses or the muscles, in some mechanical manner; and, on the other hand, in assigning an insufficient value to other classes of facts which will not, and at present cannot, be made to submit themselves to such material measurement or registration. It would seem that some very scientific persons attach more importance to the fact that some cell was $\frac{1}{1000}$ of a line in diameter than that the individual from whom the cell may have been obtained suffered pain, distress, or some other adversity! No one admires more than I do minute and accurate observation; but what I protest against is the selection of facts (when you have to deal with an individual), in such way as to record some most carefully, which you are able to weigh or measure, and entirely to ignore others which it may be difficult to express and impossible to measure.

At the present time there is a tendency to look at the order of events, as derived from masses of people now living, and the history of the masses or nations that have lived and died, but a curious propensity to disregard the individuals of whom nations and history are made; to regard the measurable physical facts, and to ignore those other facts of mind, of morals, of conscience, and of action, which make up individual life. And yet, curiously enough, in regard to the religion of the individual, it comes to this, that it is put aside altogether, is left out of the account; and it would seem to be thought of no moment that the masses, the hundreds of thousands of persons, have believed, or felt the truth and comfort of some great principle, have acted on it, have lived and died with it, as their stay and solace in the hours of keenest suffering or deepest woe; whereas the discovery of yesterday, or the fact that somebody has "determined" the atomic weight of some supposed new "element," is held to be of gigantic value. I do not wish to depreciate the value of any distinct knowledge; but what I want you to feel is, that there are complicated facts of human consciousness and belief, which are as much facts as are any others of physics or of chemistry, and these are not to be disregarded because you cannot understand them. You must take them as they stand; and let them have their weight and due value in your estimate of truth. The facts of religious life and hope are as much, are as verily facts to be taken into consideration, as are any other class of facts which the human mind is capable of feeling, of observing, or recording.

This association may help you to do this, and get at facts, by the aid which it gives you in recognising in others what you have felt yourselves. Many of you may feel stronger in your answer to the two great questions—Has man made God in his image? or is the old doctrine true that God made man in His image? Is an honest man the noblest work of God? or is an honest God the noblest work of man? Those two questions are at the root of all our religion and all our science.

Let us look at them further. Our guides to an answer are derived from scientific observation, and from what is termed revelation. Modern teaching has led many to believe that there has been a gradual development of life from its lowest to its highest form, as we know it in Man. Revelation says God made man perfect and he fell from his high estate. The theory of "evolution" is, that, from a simple cell, vegetable or animal, or indeterminate, there has been a gradual passage upwards, until Milton, Plato, Shakespeare, nay, even Christ Himself, were evolved; and that as man has become developed he has acquired the notion of right and wrong, of God, and of immortality. Revelation says, you are—mysterious words!—"the sons of God," and by your relation to Him you have eternal life; that which is right is so because it is His will; that which is wrong is so because it is against His will; and these things may be hidden from the wise and prudent, but are revealed unto babes; the childlike heart is the key of the kingdom of heaven.

Where are we in this great questioning?

The present order of affairs in this world is such that it shows a passage towards a definite end. It cannot have been eternal, or it could not be now. It must have begun at some period in time: if it goes on, as it is doing, it must come to an end in time, which perhaps might and will be calculated. I see no reason why, on the merely physical method and hypothesis, we should not calculate the times of the ending of worlds, with the same accuracy that we foretell the times of an eclipse of sun, or moon, or satellite of Jupiter. But, observe, that all such forecasting is based upon a knowledge of things as they are; and that the rate of onward progress, which is so slight, *quâ* time, in relation to the order of events, as we know them, is yet observable and measurable; and if it be taken as a gauge of progress in the past, it may lead back to unimaginable ages; but it must have had a beginning, and we have no scientific fact or hypothesis to explain beginning. The Bible says, "In the beginning was the Word;" "in the beginning God made heaven and earth."

It matters not that nebular theories may explain some processes now under observation; our solar system may have some light thrown on its past history; but beyond and before that, there lies the same great riddle, the same unanswerable question, how did it begin? Eternal pre-existence is inconsistent with our modes of thinking in regard of the present order of events. There is an observed progress which must have an end, and must have had a beginning; and science is not able to answer you in any other form. Observe that the discoveries of to-morrow or next year may alter much our views of past and present; deep-sea dredgings may render it necessary to change much that was thought to be established in respect to geologic time; but these are matters of detail, and cannot affect the general position that science, observing progress towards an end, cannot give a ray of light on the mystery of beginning.

Closely related with this subject, the evolution theory, is the notion that has been entertained of the religious life of man. Some scientific people seem to believe that man has been gradually developed, out of the lower forms of living beings, by a process of natural or artificial selection; and that he has come to what he is now, just as an oak tree may have developed, and twisted its branches, and shaped its growth in such a way as to meet the storm; or as the ivy which clings to its bark has fixed its little suckers in the gaps that hold them firmly, and through which they may gain their food. All, it is said, is determined by external conditions; some deviation from the ordinary type occurs; it is of advantage, and is perpetuated by natural or artificial selection. But let me ask if we have anything approaching to scientific accuracy in our knowledge as to that which causes these deviations from order and from type? Are not these deviations and the conditions which lead to them, if there are any, the most important objects for study? With regard to the majority of them we know little; with regard to those which have been supposed to occur in past ages we know still less; and much that has been said about them has been mere guessing, which is not scientific. There is an "order" in events, and there is "progress;" but we do not explain order by observing it, we do not explain progress by saying it exists. Order is interfered with, the ordinary sequences are changed, and as it would seem, in the main, for the better. But are there no disturbances, no deviations that tend to deterioration? Are there not processes that lead, through generations, to decay and death? Do we see families always improving in health and longevity; or do we not see gradually advancing decay? Have there not been nations that have gradually sunk from high development to a much lower stage? Have not nations disappeared? Is there not a fall, in the individual, in the family, in the race, which has some analogy to the fall of man? Is there not a something to be said for a "Paradise Lost" as well as for an evolution of humanity? Are there not in some races indications of degradation and downward movement as obvious as are the signs, in other peoples, of onward and upward growth? Let me go further, and ask whether these changes, for the good or bad, have not been related and that closely, to the goodness or badness—as we Christians hold goodness or badness to be—of the lives and habits of those races? It seems to me that what we call Christianity has strengthened that which is on the side of right and goodness, and that it has been a power in the world which has modified men and women, and families, and nations; and is now the root and essence of history, as it passes before our eyes.[1] Then, let me ask, is this all a delusion, a mere nothing but a creation of our own minds? Is it possible that the history of the world is determined by a fiction? that man, evolved from below, has for himself created a fiction which carries him to a higher notion of right and wrong, a kindlier relation between him and his fellows, and that this has no dependence upon any external facts? It is said that there are deviations from order which result in progress, and that their perpetuation depends upon advantages accruing to such deviations; but the cause of deviation has rarely been explained, although the conditions of perpetuation may be. The deviations have been supposed to be due to some external conditions, and their perpetuation distinctly shown to be so related. Let me then ask, in regard to religious belief and life, whether we are not, by analogy, led to believe that the deviations from old forms of thought and feeling may also be due to external influences, and their perpetuation due to something, some power "outside ourselves that makes for righteousness," and that will lead onwards to a still higher life? But what is this determining cause of progress? If outside ourselves, and not an essential fact of our constitution, we cannot find it in Man, we cannot find it in his environment, and I believe that we can find it only in God, "in whom we live and move and have our being;" and who determines all deviation from all previous order; watches and directs that deviation to a higher end; without whom not "a sparrow falleth to the ground;" without whom nothing can attain its end; but with whom, and by whose working, man has become what he now is, and by whose power we shall become more like Him, until we see Him as He is.

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[1] "Christianity is now the religion of power and progress throughout the world. . . . . Christians are the chief rulers, fighters, traders, explorers, and manufacturers of the earth. . . . . Christianity marks established power and vigorous enterprise. Viewed as a dominant creed, rather than a principle of holiness, it has already overcome the world."—REV. HARRY JONES.

On the theory that we have made God, that we have gradually evolved the idea of God, and righteousness and purity and charity, and that these ideas are delusions one and all; that there is no God, no right, no wrong, and nothing but selfishness at the bottom of all human life, where do we arrive? At this conclusion, as I take it—that man, gradually evolved from bacteria, through many phases, to the gorilla, and onwards to his present state, has now arrived at notions of God, of holiness, and immortality; that at the intermediate stages the various forms of life have attained their end, and fulfilled their course; but that, at this point, man, having developed up to these notions and beliefs, which fill what we call his mind and heart, who has high aspirations and unclouded hopes, is utterly deluded; that he has developed ideas and feelings which have no correlation to facts; and that the highest point attained in development is not "the last and sharpest height" from which to say, "farewell, we lose ourselves in light," but only some miserable muddy edge of the "Slough of Despond," from which to plunge through the darkness into an endless night. Other developments have attained their end, but the moral nature of man is a delusion, a mishap in nature, a failure, an absurdity.

Not only so, but those who have developed this belief to the highest point; those who have lived lives the most holy and the most self-sacrificing; who have been models of faith, hope, and charity; are the most deluded; whereas those who have said, "Let us eat and drink, for to-morrow we die," are in the right. It would then be true that the "noble army of martyrs" were an ignoble army of fools, and that there is no difference hereafter between them and the drunken ruffians who may kick their wives to death, and perchance be hanged for doing so. On the developmental theory, does this seem likely? I think not; for it seems to me to be in opposition to the facts that we have observed in the history of individuals and of races. Of course you know the reply that may be made: "They have their reward"—the one in a belief which gives comfort under pain and sorrow, although it is all a delusion; while the other enjoys his brutality and is punished at the hangman's hands. But can it be so on the theory of development? Can it be that we who have notions of right and wrong, should accept that mode of striking the balance? Can it be that this moral development in what we take to be its highest form, is a blunder, and the lowest forms of human life are the highest?—highest in this sense, that they are in conformity with fact; whereas the others are utterly mistaken, and have arrived at convictions which have no relation to fact? No, it cannot be thus; the Fiji with his fetich, and the ascetic in his cell, may both be wrong, but both may be in earnest, and may be near to their one Father in heaven, but their earnest and often painful lives, which are pure and holy, must bear witness to the truth outside themselves, which is, on the evolution theory, a truth, a something that differentiates them from the simply self-indulgent, selfish sluggard, who is wicked and unkind. Help, therefore, one another to believe in the God who made you, and who verily judgeth in the earth, and without whom nothing is holy.

Again, let me remind you of what you medical men will often meet with in your patients and yourselves; hours and days of doubt and depression, when, as Carlyle says, it seems as though "the eternal pole star had gone out;" times when, like David, you may pass through the "Valley of the Shadow of Death," and, unlike Bunyan's Christian, fail to hear the voice of "one going before" you, saying, "I will fear no evil;" times when you look up for help, and no help seems to come; times when you may cry out, "My God! my God! why hast though forsaken me?" And then the association with others may teach you to feel, that in these hours of bitter trouble and deepest darkness, you are "drinking of the cup" which our Lord drank to its very dregs; that you are "baptized with the baptism" that He was baptized with; and that, entering thus into the fellowship of His suffering, you may hope for and believe in the fellowship of His joy.

And lastly, let me say that this association may help you to get rid of what I think is a very dangerous and illogical mode of dealing with our holy faith, viz., that of taking some parts of it and rejecting others which do not fit in with our individual modes of thought. Jesus Christ said much, and He did much. The accounts which we have of Him tell us of a miraculous birth, of a life of wondrous influence and wonder working; they tell us of interferences with the ordinary course of nature; of a death which He could have avoided; that "twelve legions of angels" might have saved Him, if He had chosen, from the little band led by the traitor Judas, at the direction of the Sanhedrim; that He rose from the grave and ascended into heaven. These are spoken of as facts, and they come to us in the same books which convey His great moral teachings as to man's conduct; His great teachings as to God; and also as to the kingdom of heaven. It is the fashion often now to say, The morality is sublime. He put it upon its highest ground; it was His purity of soul, not the washing of hands or vessels; He has taught us as no man before ever taught that rightness of motive and not only external behaviour is the sign of religious life. He gave us views of God, and told us about Him that which we could not otherwise know, and for which we are deeply grateful. But He was only a Man, and though the best of men, is not to be regarded as other than a great teacher.

Now, this I hold to be as pernicious as it is absurd. If Jesus Christ was only a great human teacher, what did He know more about God or morality than any other man who might have arrived at his knowledge by ordinary processes? What could he know more than you or I? He may have inferred or have guessed, but what knowledge had He.

Again, He distinctly stated that He came from God; that He was free from sin; that He had the power to forgive sin; that no man took His life from Him; that He would rise again. He promised that whatever was asked His Father in His name He would give. Now, whatever may be the interpretations put upon some of these sayings there is, I take it, no manner of doubt that He assumed supernatural knowledge and supernatural power. He taught the highest morality of life and heart, and at the same time made these assumptions. If these assumptions were false—if He was a great impostor —what can be the value of His moral teaching; what the value of anything He said about the Father, and the many mansions, and the place He was going to prepare for us? Either He was true, or He was a lunatic, or He was an impostor. The last alternative seems to me impossible, for His words have appealed to the deepest recesses of the conscience of man from the time they were uttered until now. There was no trace of lunacy in his conduct, and although some said He had a devil and was mad, the suggestion was at once turned aside. Then He was true, and if so, He came from God, and was not mere man, and He went to God, and ever lives to make intercession for us. I know not all the meaning of those mighty words, but I feel that there is a truth in them that passes human knowledge now, but some glimpses of the meaning of which we gather through the heart, and the whole of which we may know hereafter, when we know as we are known.

This association may help you to help each other in the reading of His great words, and in the sympathy with His great life.

It is not in the moral teaching of our Lord that the great power of Christianity lies, but in the belief that He did for man that which man could not do for himself, the belief that He died for you and me, and in some mysterious manner made God and man at one. I have no power to theorise on this great fact, but I am sure that history teaches that it is a faith in Christ, a personal Christ, who died for us men and for our salvation, that has given the power to Christianity, and has moulded the life of the world?

Would men have gone to the stake, or to the lions, or the dungeon for a moral teaching? Would they have sung psalms in dying agonies for a moral teaching? Would crusades have been made for a mere idea? No; it has been for the belief in what He did, and is now doing "at the right hand of God," that men have been willing, nay, eager, to die.

From that hour when there was darkness over the land and the dying thief called out amidst the horrors of Calvary, "Lord, remember me when Thou comest into Thy kingdom!" and out of that darkness light was flashed into his soul by the tender words, "To-day shalt thou be with Me in Paradise:" from that hour to this the same voice has been heard in the hushed and darkened chambers of death; has given light and peace, and opened the kingdom of heaven to all believers; and the personal association with a still living Christ is that which, I believe, will yet comfort the souls of all in their hours of darkness and death, until that time shall come, described in those wonderful and mysterious words, whose depth we cannot fathom, when the Lord Himself shall descend from heaven with a shout, with the voice of the archangel, and the trump of God: when the dead in Christ shall rise, and we who are alive and remain shall be caught up to meet the Lord in the air, and so shall we be ever with the Lord.

This association may, and will, enable you to "comfort one another with these words."

SPECIALISM IN MEDICINE:

Being an Address delivered at the Opening Meeting of the Medical Society of University College, London, October 15th, 1881.

THERE was a time when every man was his own doctor, priest and lawyer, and with a due or undue regard to himself and his immediate relatives, may have exercised the functions of those three professions to the entire satisfaction of himself and of those about him. But the age of perfect capacity to do everything has long since passed, if a man would pay due regard to any one but himself; and yet it is not so very long since that I have seen persons who thought themselves able not only to do all these things, but to command the Channel fleet or correct telephonic apparatus, with its last and newest improvements, if such delicate operations were only confided to their charge. But are such persons competent and sane, or are they self-important people who are ignorant and crazy?

When knowledge was very small, people, and those who thought that they possessed it, were very great; but when information became great and the means of acquiring it were also vast, the want of wisdom and of power to use it made men very small.

Some departure from the primal condition of man soon became necessary, and yet not many centuries ago the "wise man," the "seer," the "priest," was the person to whom those about him would go if there was anything wrong in their mind, body or estate; and it was mainly to the priest that such appeal was made. He was the man who could give help in those rough times, and he often did so well; giving counsel to those suffering with morbid thoughts, and medicine to those with upset bodies, and advice to those who did not know how to arrange about their neighbour's landmark; and also by comforting those whose hearts were tried about the meaning of it all, and the ending of it all in some other world than this. He was the only man who knew anything outside his own daily routine of work, and so he was not only the parson or priest, but the doctor and the lawyer.

But what have we now? There are so many professions, and so many subdivisions of the work of each of them that time would fail me to say anything of any other than our own.

The priest, the doctor, and the lawyer have been distinctly separated in the general nature and character of their several lines of work; and yet often they follow their respective callings hand in hand, and with mutual help. And it is with no disrespect to either profession that I say it is not outside the experience of some that the priest feels the pulse, and occasionally asks questions which he might have left unasked; and sometimes gives drugs, often of harmless homœopathic sort, but sometimes does things, and more often says them, which may be mischievous; and that the doctor also goes outside his vocation in the matter of prayers and tracts; and that the lawyer does not always see the distinction that the clergyman sees upon ritual or doctrine; or that the physician holds to be of importance to public or domestic health. We know that it is so; but we might do well, perhaps, to regard these acts in the light of spasmodic activity of the organs left in a rudimentary state in either one or the other, by the processes of differentiation, evolution, and specialism, that have brought us to the positions we now occupy.

I draw a sharp and broad line between those words and their outcome in modern present life. "Differentiation" means "division of labour;" "evolution" means its upward growth in utility to all; and "specialism" means its abuse.

With the expansion of human life, and the increasing complication of its requirements, division of labour becomes a necessity. The simple cell, with its simple elements, may, as it does, in some low forms of organisation, as we term them, do all that the cell needs to do. But some cells, looking equally simple, have within them powers that necessitate, for their real use, a differentiation of those powers; and so, out of a primordial cell, with some appropriate materials and conditions, muscles, nerves, and the like, are grown and rendered useful. And so it is with human life, and all its complex social arrangements. Some of the differentiated elements must do one thing, and some another; and so the corporate body (as it is sometimes called) of humanity requires this aid.

It would be simply waste of time if I were to say anything more about the entire necessity for division of labour. It would be waste of words for me to tell you, members of this Medical Society, for you must all know it quite well, that you cannot, any one of you, attain to the proficiency in all of the several branches of your calling to which others have attained by special work.

You must be content, first of all, to master what is *common* to all—*i.e.*, the knowledge that will fit you to undertake *all* the work that will come before you in after-life: the common knowledge of facts and principles, without which you can have no good ground from which to start in any special work that you may wish to do.

Next let me say a few words about "evolution." Your able assistant clinical professor, Dr. Poore, said, in this theatre, a few days ago—in the admirable and wise address which I had the great pleasure of hearing—many weighty things, well worthy of your consideration, as to the meaning and use of words. Let me urge upon you to realise that which he said, and to see carefully to it, that such words as "evolution" and "survival of the fittest" do not in themselves convey the whole of biologic or social science. "Evolution" does not involve in its primary meaning all the disturbing elements that may derange its processes, when these have been brought into it, from outside, by *perverse* activities of surrounding forces; nor does the phrase "survival of the fittest" distinctly convey to every mind an answer to the question, "Fittest, for what?"

When I used those words a few moments ago it was my intention to convey to your minds that which, in the progress of time has to be observed and valued in our profession—viz. the progress from the lower to the higher ranges, from the simple to the complex; and so far as individual work may make it so, the giving of the results, which special labour, could, or can alone obtain, to those whose circumstances were such that they could not obtain this information for themselves. The results of their toil have often been given by these special workers to those who have no time nor opportunity for such direction of their industry; and they are of vast advantage to those who can use them well. By such mutual help all may derive advantage, and medical science may be carried, as it has been, to a higher state of usefulness than that which it could otherwise have attained.

But by the expression "survival of the fittest," it seems to me sometimes questionable whether or no, the words being unqualified, there is expressed exactly what we mean by professional progress in any other sense than progress of the individual. The response to the earnest feeling expressed in the words "il faut vivre," may be perhaps answered now, as it was years ago, by "je ne vois pas la nécessité."

In many instances this division of work, and this progress of evolution, have resolved themselves into "specialism," and it is to that I wish now to direct your attention. It is, in my view, the wrong side of two right things and processes, the abuse of divided labour, and evolution of knowledge. At the outset, let me remind you that there are thousands of members of our profession practising in town and country who are absolutely free from the vice of "specialism," but as absolutely dependent, if they do their work well, on the labours of the "specialists." All honour to them; their life is hard, and in the country they are beset with difficulties and risks to which the London or town practitioner is not exposed. The one has to undertake anything and everything at a moment's notice: to treat apoplexy or pneumonia; to set a broken limb; encounter a case of placenta prævia; treat croup and diphtheria, cholera and chicken-pox, and to do this single-handed; and in the vast majority of instances, he is equal to the occasion. In all sudden or acute maladies he must do something before any outside help can come, and he must often do this promptly, and do it all. The other, the practitioner in a town, is equally liable to sudden calls and immediate responsibilities, but within ten minutes he can generally summon to his aid a professional brother to share his responsibility, or advise him, from some special knowledge as to what he should do, and so much mitigate his sense of care.

But if the country practitioner be thus well informed and able to do his work, and do it well, let me ask in what way was he fitted for this work? And to this I answer, without hesitation, by the work of specialists, who have taught him, in the wards of hospitals, and in systematic lectures, and by their writings, that which their special work has enabled them to teach, and which they could not by any but the rarest gifts or still rarer accidents, have obtained in any other way. Other men have sown and they have reaped, or entered into their labours.

It is not possible that the courses of instruction that are given in this College and hospital could have been made of any use to the general practitioner unless the teachers had already been taught by their own "special" devotion, or by that of others, to separate branches of inquiry, so numerous that life is by far too short for any one man to acquire, by his own industry, even a superficial knowledge of them all, or of a hundredth part of them. The results of years of labour are summed up by your teachers, and these fit you to undertake the work of life. These, in physiology, in medicine, and in surgery, are the outcome of special work, digested, sorted, and put forth into shape the most usable for those who have to learn.

But when I speak of "specialism," the word carries us into a region quite other than that of helpful work; into that of miserable "retrogression" instead of "evolution"; into that of the "survival" *not* of "the fittest," but of the charlatan and the quack.

You may not know all, or even much of this, and I hope that you never may, because there is a belief in my mind that "specialism" may die out. I may not live to see it, but you, many of you, will; for foolish as people are, they are beginning to see through much of it, if not all.

But let me make one word of distinction between specialism and the adoration of great names. For the former our profession is to blame; for the latter the public. I have known distinguished surgeons go down into the country to say whether or no a patient with rheumatic fever had endo- or pericarditis, when neither of them would know which end of the stethoscope to use. I have known physicians treating onychia or stone, and doing minor operations in surgery, for which, as the results proved, they were quite incompetent; but I have also known men in both major branches of the profession who have declined to accept such responsibilities, and who referred the applicants for relief to those "who could help them wisely and well." Great names will often override specialism; but, as I have said, that is due to the fault or ignorance of the public, and has its reward.

If you ask me to define what I mean by "specialism," I should say, It is a morbid condition of the mind—of physician or surgeon, as the case may be—which shows itself in his regarding every patient who comes under his care as a sufferer from the particular disease which he has studied; of seeing the symptoms only from the point of view which he has assumed, and made quite clear—to himself, and of treating it in a manner which no one like himself understands, with the utmost degree of attention, frequency, and speciality of treatment that his patient's patience will endure or permit.

It is well to *classify* "specialities" and their commonly attendant "specialisms"; and the classification which is now proposed is of a somewhat "natural order." First of all there is the distinction between those who deal with men, women, and children; then, secondly, those who treat either of those groups of patients as being sane or insane; thirdly, those who divide certain parts of the human being upon a somewhat regional, anatomico-physiological basis, and take as their fields for cultivation the nervous system, respiratory system, digestive system, and the like; fourthly, those who make particular diseased conditions, such as gout, fever, or consumption, their line of study; fifthly, those who take special lines of work, such as medico-legal practice, in courts of law.

1. *Men, women, and children.*—To what does specialism often lead? There are many surgeons in large cities who never, except by caprice, accident, mistake, or good nature, find a lady in their consulting rooms. They have to treat what they find in the so-called "sterner sex," and their practice becomes somewhat closely confined to a particular class of maladies that most frequently arise from irregular modes of life, of which many of them are ashamed. There are those who have chosen this speciality, and done what they have to do, with good to their patients, credit to their profession, and honour to themselves. But this cannot be said of all. Are there not some who prey upon the sense of shame, and extort money for needless operations and worthless drugs, holding *in terrorem* over their victims the knowledge of facts that have been confided to them, and using that knowledge, which is power, to benefit not their patients but themselves? Are there not undergraduates and others who dare not "call in the family doctor?" and are there not "potent, grave, and reverend signiors," who are just as anxious as their sons may be that nothing of their malady should be known at home? The consulting-room—as sacred as the confessional—is degraded to the lowest depths of degradation when it is used, or abused, as the engine of terror and extortion. But yet debts are incurred, and bills are drawn, and Jews are sought for—ay, and Christians too—in order to meet the so-called obligations of these sufferers. The surgeon has the power in his hand, and he knows it and wields it, often with a cruelty that no words of mine can utter or efficiently contemn.

The surgeon who resorts to no such baseness as this might, I think, in another way be helped if occasionally he had some other things to do, and were every now and then consulted by some few of what is called the "softer sex," of pure life and exalted character, some one of virgin soul or matron dignity who might break in upon the routine of daily practice and teach by their bearing and their anxiety a higher lesson than that which is learned mainly in the chatter of the clubs. The surgeon becomes rough and ready, and there are hundreds to speak well of his skill; but often his roughness has risen to such point that men will say, "I cannot again see So-and-so, he is so outrageously rude and overbearing."

We know that there is a very large number of physicians and a very small number of surgeons who devote their life to the treatment of women, and who do their work well, never shunting a duty, never overstating a case, never condescending to anything in their practice that they would object to offer to the inspection of the *élite* of their professional brethren. They have studied, have learned, and have taught, and their lives are as valuable as they could wish them to be.

But we know that there are others of whom this cannot be said. Physicians have coined names for trifling maladies if they have not invented them, and have set fashions of disease. They have treated or mal-treated their patients by endless examinations, speculations, applications, and the like, and this sometimes for months, sometimes for years, and then, when by some so-called accident the patient has been removed from their care, she has become quite well, and then there has been no more need for caustic, speculum, or pessary.

The profession is not altogether to blame for this. Such is the want of education on physiological matters that women do think and feel a great deal more about any "irregularities" of a certain kind than there is reason for them to think or feel. They attach an amount of importance to dysmenorrhœa entirely out of proportion to that which they render to dyspepsia; and tight-lacing, and ball-dressing, and all that they involve, are disregarded, so long as these special functions are not disturbed. But when anything goes wrong in such way that the lunar periods are put out, then the specialist is consulted; and happy is it for them if the doctor himself does not suffer from "specialism." If he does not, he treats the patient as she ought to be treated; if he does, too often he makes a case of it; and then follows the whole ritual of what I need not describe.

Some years ago "ulceratio uteri" was the fashion, and applications of various sorts were made, two or three times a week, in order to cure a malady which some eminent men, in special practice too, said did not exist. Lately I have rarely heard of this complaint; the disease has died a natural death, or has met with a violent end. But now, according to some authorities, there is scarcely any woman living whose uterus is where it ought to be. It is anteflexed or retroflexed, or verted this way or that, so that all kinds of contrivances have to be adjusted and readjusted in order to cure backache, vesical irritation, albuminuria, hysteria, and I know not what besides. Now, when this is all done by some one who knows with what he is dealing, and honestly deals with it, as many do, much good may be accomplished; but when imitators of the good workers take such cases in their hands, nothing but harm can follow. There are meddling and muddling of the most disreputable sort, and the patients after a time grow sick of it, and give it all up, and get well; or they go on from bad to worse, and become chronic invalids, and a great trouble to themselves, their relations, and their friends. There are the consulting-rooms of some doctors that are as they ought to be. There are others soothed by "a dim (can I say) religious light," into which the patients are ushered and in the dim silence of which, all this kind of "treatment" goes on. And not only so, but in their own homes patients are sometimes treated by—or shall I say to—a vaginal injection of warm water, which the physician himself must administer.

This kind of thing is "specialism;" and in one of its worst forms. It is the taking advantage of a natural solicitude on the part of women, and of their undue anxiety; and, instead of correcting it by steady purpose and common honesty, it is pandering to the weakness of human nature, putting the patients into a feeble condition of dependence, and rendering them unfit for life in all its personal and domestic relations.

If some surgeons may be at fault in seeing life only as they read it in the clubs, surely some specialistic physicians are also to blame in looking at life only as they see it through a speculum ; and it would be of advantage to them if they could occasionally have men for their patients; and so lose a little of that tendency to soft words and compliments, in the use of which they are such conspicuous adepts.

There is not much that need be said about specialism with regard to children. They are virtually unsexed, and so do not fall into the hands of either of the classes of practitioners that I have mentioned. But it is quite possible for the man who deals solely or even mainly with children's diseases to take an exaggerated view of their differences from those with which adults may be affected, and so construct a pathology and a therapeutics which may be of disadvantage to the profession, and of no real use to the child. Specialism can scarcely be said to exist here, unless it be in the physician who sometimes takes upon himself the functions of the nurse, and sees almost all things from a nurse's point of view.

2. *Sane and insane.*—The speciality of the physician who directs his attention mainly, or it may be even exclusively to the charge of the insane is a most direct advantage to the profession and the public, and this is demonstrated by the fact of its general recognition. This is true, however, only when the physician is at the same time competent to treat the other bodily ailments that may range themselves around the brain-disease with which he has primarily to deal.

The fault of specialism, however, in this department is that the so-called "mad doctor" fails sometimes to see anything from a sane point of view. The *mens sana* is a myth to him, and he cannot bring himself to believe in its existence. He may think that it exists in *corpore sano* of his own possession, and in other corpora of his friends ; but beyond that narrow range the sane mind is not to be found in those who are suffering from anything which may perturb the current of their thoughts. He may be right in regarding all people as somewhat mad, but he may be wrong in thinking that all men are so far mad as to require restraint.

There can be no doubt as to the fact that men and women have been, in the past, and sometimes—but much more rarely—in the present, dealt with as insane, when they were simply incompetent, vacillating, eccentric, extravagant, or perverse. But the mode in which "specialism" becomes mischievous in these physicians is this, that they have but one idea, and that is that the patient must be secluded, or sent to an asylum to be treated; and the upshot of such advice often is that the patient is not "treated" in any other sense than that he or she is delivered over to the care of attendants, who are not always of the best informed, the wisest, or the kindest sort.

The physician who is affected with "specialism" in regard to the insane, seems to take his stand upon the threshold of an asylum—half in, half out—holding that to be the stand-point for the observation of human life, and human history; and bases his creed, with regard to both of them, upon the facts that lie behind him, and does not look, face outward, into the world beyond.

3. *Regional physiology.*—There are *specialisms* in regard of nervous system, of lung and heart systems, of digestive systems, and the like; and with regard to them I have but this to say, that the faults lie in the incompetency which many who have devoted themselves to one line of study often exhibit in their analysis and diagnosis of cases, into the complicated conditions of which their speciality of study has prevented them from entering.

Thus I have known learned and distinguished "nerve doctors" speak of grievous palpitation of the heart as a merely nervous phenomenon, when the patient had dilated heart, with obvious valvular disease; of dyspnœa of a very trying sort as a "nervous condition," when there were, in addition to dyspnœa, cough, expectoration, and the physical signs of emphysema, chronic bronchitis, dilated bronchi, and enfeebled heart; of short breathing described as "hysterical," when one half of the chest was filled with fluid.

On the other hand, "heart and lung doctors" have failed to see that anything was the matter, because the stethoscope could tell them nothing, when it was obvious that disease of the spinal marrow in some cases, and disease of the kidneys in others, was the cause of altered breathing.

Again it has been my lot to see "digestion-doctors" worrying their patients with blue pill and elaterium, and bringing them to the verge of extinction, from not having been able to discern that a diseased heart was the *fons et origo* of their sufferings.

4. *Special diseases.*—With regard to these "specialism" is sometimes more interesting and amusing than directly mischievous. There are consumption doctors, cancer doctors, gout doctors, and the like. If the former send their patients to the Riviera, or the uttermost parts of the earth, when it was unnecessary for them to make such pilgrimages, the patients at least have the benefit of new scenes and of sometimes acquiring the knowledge of a foreign tongue. If cancer doctors have given, with grave looks and graver forebodings, a diagnosis and prognosis that may have been most distressing, yet sometimes tears have been turned into joy, when the tumour has disappeared, and the cancer of the liver has turned out to be a gall-stone. If "gout doctors" have given their patients very wise instructions as to life and diet, they have often been rewarded by the extermination of "the fear of evil" that the patients suffered from, and have found favour in their sight.

5. *Lines of practice.*—The one illustration that I will give now is that of the specialism which affects many members of our profession when they are in the frequent habit of giving evidence in courts of law, and I will take, for example, that which happens in the case of railway accidents. It is now pretty well known who among the physicians and surgeons of the day will be called upon for the plaintiffs—the injured, and who for the defendants—the company. So familiar in legal circles has this knowledge become, that the phrase "So-and-so is a very rising witness," has been used, and not unfrequently. What does this mean, but that members of our profession, whose one object should be truth and justice, "take sides?"

Many years ago much of this came under my notice, and I alluded to it in some lectures which I had the honour to deliver before the College of Physicians; but for many years I have declined to take any part in such proceedings, owing to the manner in which evidence was given by what I must call "party witnesses."

It seems to me quite unpardonable that six or eight members of our profession should meet together and go through the farce of a so-called "consultation," when neither one of the physicians or surgeons on the one side would interchange a single word with those on the other. I have tried to break through this absurdity more than once, and sometimes have succeeded in my attempt. But more frequently I have failed, and have given it up; and this because I have heard said, in courts of law, things that were so utterly unscientific, ignorant or perverse, that it was simply impossible to deal with them. One instance will suffice: after carefully stating a case, which I had examined, to be hemiplegia, the result of accident, it was urged "on the other side," by an eminent surgeon, that the man was "shamming," because forsooth, he did not exhibit ptosis, strabismus, and dilated pupil, and that he had never seen a case of hemiplegia in which those three things did not co-exist!

There are some members of our profession who have become specialists in this direction, who seem to think that everything that a man tells them of his subjective symptoms are matters of fact and of great importance; and, on the other hand, there are those who regard every plaintiff as either a knave or a fool, and most probably a combination of the two, but who never believe that any man is injured in a railway accident unless he has broken his neck, or has a compound fracture of his thigh. It is time that this specialism should come to an end, and we of our profession can bring it to an end, if we will but insist upon it that the meeting together of the doctors is a consultation, and not a farce.

In conclusion, let me revert to an illustration used at the outset with regard to what "differentiation" means, viz., the springing into being of varied structures, with their varied uses, and of their development into the being of a perfect whole—a living thing with complex powers—all its parts subservient to the ends for which they were intended, and for which they are so ordained as to conduce to the "survival of the fittest;" but let me carry the illustration yet further, and say that all these different members are members one of another, and that when any member suffers all the other members suffer with it; and that when any physician or surgeon does that which is ignoble he not only does injury to himself, but to the whole of the noble profession to which he belongs.

THE HARVEIAN ORATION

Delivered before the Royal College of Physicians, London, October 17th, 1884

SIR WILLIAM JENNER, Honoured President of this Learned College,—Before entering upon the subject which now brings us here, I must ask you to accept my thanks for the distinction you have conferred on me, in selecting me for the office I have the honour to fill to-day—an honour, allow me to add, which carries with it a special gratification to myself, inasmuch as among the many distinctions conferred by this College on my grandfather — the late Dr. Henry Revell Reynolds—there was not one he prized more highly than that of having delivered, as he did before the President and Fellows of this College, one hundred and eight years ago,[1] the Harveian Oration.

Mr. President, Fellows of this College, and Gentlemen,—Sir Thomas Browne has said, in one of his sadder moods, "Our fathers find their graves in our short memories, and sadly tell us how we may be buried in our survivors. . . . The great part must be content to be as though they had not been—to be found in the register of God, not in the memory of man."

This is, without doubt, true, as he said, of the "greater part;" but it is not true of all; for our meeting here to-day is an assertion that there is, at least, one who has not yet found his grave in our vanishing powers of recollection; but whose life, unburied, still breathes in the lives of living acting men.

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[1] *Roll of the Royal College of Physicians of London*, Edited by Dr. Munk, vol. ii. p. 300.

It is not of the sorrows and unavailing tears that were shed, nearly two hundred and thirty years ago over Harvey's grave, that it behoves me now to speak; but rather of the fact that nearly three centuries have passed since he became a part of this College; and yet that only last year, on the eighteenth day of October, our College repaired to his grave in Hempstead, to do honour to his memory; and with gratitude and gladness to assert, as we do again to-day, that he still lives in his survivors, and that, although the knells of three hundred and six years have been tolled since Harvey's life began, he at the present hour is neither dead nor sleeping.

I. Let me ask you, for a few moments, to think over that act of last year. It is not meet to call it a ceremony or performance, for those words may have a doubtful meaning. It was a something done and that with purpose. It was done with reverence and solemnity, and fitting formal circumstance. The like of it has not often been seen in this country. It was simple, but it told of much complex thought and feeling. It was grave, but it was not sad; it was official, but it was not heartless. It was unnecessary, but it was urgent. It was a duty to the remains of Harvey, but it was also an honour to ourselves. Its voice could not "provoke the silent dust," but its tone—not that of "flattery" to "soothe the dull, cold ear of death"—was such as could stir the now living ear and heart, and quicken the still acting brain.

A. One thing that this College did last year was to show regard for the *bodily* remains of Harvey. There was a something of him—that neither painting nor bust could be—which it still wished to cherish. It would try to hold together, yet longer, the last remnants of what was once the medium through which he saw Nature, and by which he read many of her secrets, and revealed them. This wish is natural; and old because it is so. If some eastern nations, in their great reverence for the soul, have taken means to display their contempt for the body which it has left, such peoples have been the exception.

The pyramids, the abbeys, the great burial-grounds in town and country, and the world's great surface, scattered over with its complex or simple tombs, all tell the same story of regard for the dust and ashes of those who are gone. Even if the body has been burned, the urn has been found to hold together the ashes that the flames have not had power to kill. We may know, and admit "to what base uses we may return;" but still, we resent or recoil from the degradation. There is a widely spread human struggle against allowing the bodies of those we have known, and reverenced, and loved, to merge into the common earth. We set up our barriers against it; we entomb, and we embalm; we carry on a fight, as strong in feeling as it may be futile in effect, but still, a real fight, against physical disintegration. This may be all very foolish and unscientific; but yet, we will, if we can, keep together something of the individual, so long as time and outside forces are not too strong for us; and we utter a parable, as we do so, of our regard not only for the bodies, but for the lives of those individual men, as we tell of them, or come to know of them, in the thousand biographies that surround us, each one of which is, in its very essence, "a feeble struggle with death."

The notion that some spark or germ of life might lie hidden in the ashes that were buried or inurned (lateat scintillula forsan) may have had much to do with the careful keeping of the ashes in the past; but that is not all. Even if science could quite put out this faint "scintillula," the human instinct would remain; and would show itself beside almost every open grave, and sometimes display itself in such solemn and remarkable event as that which took place last year at the tomb of Harvey.

It was a graceful and an honourable act of this College to take upon itself the work of "Old Mortality," and to travel away from its ordinary home that it might chisel afresh the marbles that held the remains of its greatest son;—but much more than this was accomplished at that time, for therein was shown a profound and still living affection, reverence and gratitude for Harvey's life.

B. We, again to-day, would do homage to the *life* of Harvey: looking at it in its threefold aspect of moral, mental, and active energy. We commemorate his character, his rare combination of faculties, and his work achieved. In him there was that due proportion between all his powers which a great thinker of this generation has regarded as the root-fact of what we call "genius."

We like to picture to ourselves what he, now dead in body, resembled when he lived; how he thought, and about what he thought; how and what he did; in what light he regarded his own work; its relation to the work of others, to his ancestors in science, to his immediate predecessors, his associates, his antagonists, and to those who must come after him.

This is as natural as is the regard for the bodily remains; but it is on a higher level. Ancient "songs" handed down, in earlier days, the noble deeds, thoughts, words, and characters of those whom it was a religion to venerate, and whose memory it was a bounden duty to prolong.

Our short biographies in epitaphs, our longer biographies in books, bear witness to our dislike to the cremation of ideas and of individual life. There is, doubtless, much disintegration and cremation, of a very healthy sort, always going on among the works of the living as well as of the dead; and very small urns might hold all that is worth keeping of the life-work of many. Still even of these, we should like to engrave the names. Perhaps, in most lives, there are many things that those who lived them might gladly see burned away; but (as Sir Thomas Browne says) "we cannot hire oblivion," and even if "a wise oblivion be a greater good than a strong memory," we still like to preserve the individuality of the really great ones of the earth, and that, with all their faults; and we resent—as we do with quite small people—either a flattering, or a disparaging, or a one-sided picture.

Reading Harvey's own writings, his theses, their introductions, their dedications, his disquisitions, exercises, letters and "obiter dicta," we find him writing, all unconsciously, his own biography; and this confers an unspeakable charm upon his works. He does not tell us of his birthplace, or parentage, or where he was taught, or how he lived—which, thanks to many who have written of these things, from Aubrey and Ent to Willis, we know fairly well—but he reveals his very soul and life, his method of work, and his mode of thinking about it all as he spent those long years of research, experiment, discovery and disputation, together with all the toils of a teacher, and the cares of a busy practitioner of medicine.

Thoughts, discoveries, and lives are quickly disintegrated in this fast-moving, restless age, the rate of whose movement shows acceleration every year; and so there is much individual work that must soon pass into, and be lost in, the sum of common knowledge, and become only the ground-work upon which many a superstructure may be raised; but the personality of Harvey can never be lost sight of, so long as this College stands, and so long as there are men who care to read between the lines of his great works, and find in them the portrait of himself.

It is important in our attempt to realise this portrait, that we should look—in order to appreciate its value—at the background of the time in which the great artist sketched it.

(*a.*) Harvey's work of discovery, like that of all great discoveries—into whatever reach of knowledge and of thought they may have broken—was not unprepared. Men were, in his time, eagerly looking for a light that they felt sure was coming; and there were streaks of dawn in the eastern sky, that led them to find the Man, and the Truth, for which they had been seeking; so that what before had been mysterious, was now clear; what had been dark, was now illumined; what they had sought for, now they found.

The contents of the "shell," on which Harvey was afterwards to write so much, were teeming with a growing life that showed but vague signs upon its smooth, unbroken surface; but Harvey broke the shell, and there burst forth at once, into a seen life, a form and meaning for which all the growing processes within that shell were made. There was a new thing, a new thought, a new generalisation. There was the solution of the problem yesterday, the answered riddle, the platform for to-morrow's work.

All honour to those who, toiling slowly in the night, or in the dawn, with its mist and mystery, have yet made some headway forward and upward, and prepared the path for one among them, who has shared their labour, their weariness, their disappointments, and their woes; but, who suddenly makes, as it were, a leap to a wider range or to a higher level; and, thence, holds out the hand of strength and fellowship to place them by his side. We honour the worker, wherever he may be, so long as his labour is honest, and is his best; but we have only scant words to express the regard in which we hold the man whose discerning thought and practised skill has lifted all workmen higher; opened to them new ranges for their toil; given them new methods to follow, and left behind him footprints in which some of them may tread, as he goes before them, and passes out of sight.

The peoples in this world have been always fighting, from the days of Cain and Abel until now; but there is a book, written not so very long ago, with the title of *The Fifteen Decisive Battles of the World*, and perhaps time is yet too young for any one to say that a sixteenth has been fought. But in the great conflicts of schools of science, of thought, and of discovery with regard to human life, can we put our finger upon even so many as fifteen who have made such marks in history that their works have followed them as decisive battles gained? If there be, let us gladly thank all the great heroes who led these fights; but, if we look among them, there is no one, whom the gathered-up roll of leaders in the world of thought can show, who stands on a higher plane than does our own immortal Harvey.

(*b.*) If we would appreciate the value of his work, we must read the writings and become familiar with the beliefs current at his time. We may find their echoes in his replies to his opponents, and see quite plainly that the notions he had to contend with were not even guesses at truth but often merely pompous assertions of meaningless nothings—"traditions vainly received,"—but yet held with the cramp-like grasp of drowning men who clutch at straws, and yet uttered with the confidence of those who might be supposed from the loudness of their cry to be standing firmly and steadily on solid ground.

Those who held them were quite incapable of perceiving that they were empty dogmata, without one particle of substance in their constitution, or one square inch of fact upon which to plant themselves. They seem so nonsensical now that it is almost impossible for us to imagine Harvey caring to reply to them. But, in his day, they were very real, very vexatious, and very hard to bear. To us, they are less than distorted dwarfs, but to him, they were giants whom he had to fight, and with whom he did wrestle hard. As in the glory of an acknowledged triumph, and in the brilliancy of its reward, we may lose sight of the hard fighting, the heavy blows, the waiting, the misrepresentation by enemies, and the desertion by his friends, through which the hero passed as he fought and won; and, as he himself—when he can say with thankfulness and truth "I have fought a good fight"—may forget, amidst the acclaim of acknowledged victory, the horrors of the battle-field—although the fighting had been very real, and the blows very hard;—so Harvey in the lull of opposition seems to have been sometimes at rest, and in full enjoyment of the results of his fierce struggle; but while his own conception of the truth was developing day by day and month by month, he struggled hard with the prejudices, the open attacks of jealous competitors, and the scandal of men, too dull to originate, too small to think, too dishonest to appreciate, and too weak to yield. When his great discovery saw the day, his soul rejoiced that a new Truth was born, and, it may be, that he forgot the travail of its birth. But, for all that, the pain had been very real, and it must have needed all his confidence, all his perseverance, all his energy, and all his patience to have borne the trial without once wincing at it.

Having said these few things with regard to the preparation made for Harvey by those who had preceded him, and having glanced at the conditions surrounding his active life; let me call your attention to his forethought, and instructive prevision of some of the results obtained by the labours of those who followed him.

(*c.*) Great men have always foreseen much; or, at all events, have said or seen things of which they perhaps did not, and could not fully appreciate the meaning. They have scattered germs of thought around them, as they passed, through the varying fields of life, to the point, or end that their determination impelled them to attain; and some of these seeds of future discovery have "fallen on good ground, and brought forth fruit." There is here some instance of the process of evolution in regard to scientific discovery. Harvey reaped much that he had not sown; but he sowed much more which others, after him, might reap.

The evolution of scientific discovery—which is a matter of simple fact—suggests questions which cannot be discussed on this occasion, but which we may do well to consider.

Is there any "spontaneous generation" of ideas?

Can man ever do anything outside the lines in which his forefathers thought and reasoned?

Can he originate anything as by a "sport;" or, must all that he can think or know, be but the outgrowth of the germ-thoughts of others; or the mere learning of details quite far away from what we mean by discovery?

There is ancient authority for believing that "there is no new *thing* under the sun;" but has there been no new *thought?* If creative energy be limited in matter, is it also limited in mind? If there has ever been an act of creation, may not such an act be repeated?

May I not further ask, if, in the words of the really great men, there are so many fertile seeds, which alone are the germs of all that is to come, may we not, instead of adopting hastily, as we sometimes do, the most charming generalisations of the last few years, and saying, along these lines all thoughts must run, rather adopt the mood of the great scientific poet of Nature, and feel that "seeing of a thousand seeds, she scarcely brings but one to bear," should join him in his doubt, and "tremble where we firmly stood?"

If it be that Harvey was right—which modern scientific observation has shown that he was not—when he suggested that the force which converted sterility into fertility is one that pervaded the whole body,[1] and might last almost indefinitely; then, upon analogy, we might argue that the thought of the great discoverers of all past time may have fertilised the whole race of the thinkers that followed them, and of the thinkers yet unborn; and so discovery and originality are surds, for they could have had no beginning. To this it may be replied: the modern appliances of scientific research have shown that, in some points, Harvey had no means of correcting the dicta of his forerunners by his favourite appeal to Nature. Is it not possible then that we are as yet unsupplied with all the *apparatus criticus* for determining whether or no there is such a possibility as an "original thought"?

(i.) As a means of estimating the largeness of Harvey's mind, and the wide range of his vision, and how much there was that he "saw" but scarcely can be said to have "looked at;" let me recall to your notice some of the more interesting of his *previsions*, as forming part of the work of the individual whose memory we meet to-day to cherish.

We find him saying, "In general the first processes of Nature lie hid, as it were, in the depths of night, and by reason of their subtlety escape the keenest reason no less than the most piercing eye."[2] In another paper, "All living things . . . derive their origin from a certain primary something or primordium which contains within itself both the 'matter' and the 'efficient cause;' and so is, in fact, the matter out of which, and that by which, whatsoever is produced is made."[3] Again, "It appears advisable to me to look back from the perfect animal, and to inquire by what process it has arisen, and grown to maturity, to retrace our steps from the goal to the starting-place; . . . so that we shall perceive from what primary matter and from what efficient principles, and in what way from these this plastic form proceeds. . . ."[4] Further on, in the same paper, we finding him saying, "Man cometh into the world naked and unarmed . . . as if Nature had desired that he should be guided by reason rather than be driven by force ; therefore did she endow him with understanding, and furnish him with hands that he might himself construct what was necessary to his clothing and protection. To those animals to which Nature has given vast strength, she has also presented weapons in harmony with their powers ; to those that are not thus vigorous she has given ingenuity, cunning, and singular dexterity in avoiding injury."[1] In connection with this, he proceeds to mention the "ornaments . . . offensive weapons, teeth, horns, spurs, and other implements employed in combat . . . the subject of dispute being no empty or vainglorious matter, but the *perpetuation of the stock* in this line or in that ; as if Nature intended that he who could best defend himself and his, should be preferred to others for the continuance of the kind."[2]

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[1] *Thesis on Conception*, p. 576, in edition of the "Works of Harvey," by Dr. R. Willis, for the Sydenham Society.

[2] *Anatomical Exercises on the Generation of Animals*, p. 225.

[3] *Thesis on the Uterine Membranes and Humours*, p. 554.

[4] Introduction to *Exercises on the Generation of Animals*, p. 163.

In the passages just read, we have, as it appears to me, very much the same ideas as are now conveyed by the terms "protoplasm," "the relation of man and animals to their environments," and the doctrine of "the survival of the fittest."

With reference to the significance of the primordium, the protoplasm, as seen by Harvey, let me read another passage from his writings. Speaking of the lowest forms of life known to him, he says, "These have no heart, as not requiring any impeller of nourishment into the extreme parts ; for they have bodies which are connate and homogeneous, and without limbs, so that by contraction and relaxation of the whole body they assume and expel, move and remove the aliment. . . . The whole is used as a heart, or the whole animal is a heart."[3] Further on, "All local motion proceeds from and has its original in the contraction of some part."[4]

Here we have, as it seems to me, an account of the simplest form of life ; his counterpart of the amœba, as we may find it described in the most modern, and, to my mind, one of the most able text-books of physiology of our day.[1]

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[1] Introduction to *Exercises on the Generation of Animals*, p. 425.

[2] *Ibid.* p. 526.

[3] *An Anatomical Disquisition on the Motion of the Heart and Blood*, p. 76.

[4] *Ibid.* p. 81.

(ii.) Another interesting forecast of Harvey's is found in his pointing to the local variations in blood-supply as being dependent upon the vessels. He describes the extremities as becoming cold, "the nose and cheeks and hands looking blue;"[2] "the fact that in almost every affection, appetite, hope, or fear, our body suffers, the countenance changes, and the blood appears to course hither and thither. In anger the eyes are fiery and the pupils contracted; in modesty the cheeks are suffused with blushes; in fear, and under a sense of infamy and of shame, the face is pale, but the ears burn as if for the evil they heard or were to hear."[3] "The blood," he continues, "varies greatly (in its rate of force and movement) according to age, sex, temperament, habit of body, and other contingent circumstances, external as well as internal, natural or non-natural."[4] In another place he says, "We allow to the arteries the same motions which we concede to the heart, viz., a diastole and a systole, or return from the distended to the natural state; this much we believe to be effected by a power inherent in the coats themselves."[5]

The direct object of Harvey in this passage is to show that the heart distends the arteries, and that they collapse by their own contractility; but, taken in conjunction with the other passages that have been quoted, it gives a forecast of what is now of such immense advantage to us, viz., a knowledge of vaso-motor change.

He perceived the altered calibre of vessels; he saw this in both contraction and dilatation; he referred this to a power inherent in the coats themselves; he pointed out the relation between these changes and external conditions; also between them and emotional excitement and depression; and yet again, to contingent *internal* circumstances.

A hundred and eighteen years after Harvey published his treatise on the Circulation, Robert Whytt, the President of the Royal College of Physicians, in the sister city of Edinburgh, wrote these words: "Some grow pale upon anger; which effect may be owing to a spasm, or continued contraction of the small arteries of the face, by which the motion of the blood will be retarded;" and again further on, "in blushing, the increased motion of the fluids through the vessels of the face is accompanied with a glow . . . ;" and yet again, "the sense of cold and shivering is owing to a spasmodic contraction of these vessels, in consequence of that irritation which the nervous system suffers from the febrile stimulus or the beginning of inflammation."[2]

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[1] Introduction to *Michael Foster's Text-book.*

[2] *On the Motion of Heart and Blood*, p. 69.

[3] *Disquisitions on the Circulation of the Blood*, addressed to John Riolan, p. 129.

[4] *Ibid.* p. 128.

[5] *Ibid.* p. 113.

Whytt does not discuss the circulation of the blood as described by Harvey, he assumes it as an established dogma; he makes no allusion to any anterior suggestion of change in the calibre of vessels; but he seems, chronologically, to hand down the light of Harvey's torch to these more recent days, in which Claude Bernard, Lister, Brown-Séquard, and others have shown, by their researches, the importance of the knowledge that we now possess of the vaso-motor system of nerves, and its effects upon the function and structure of organs; as well as its relation to the doctrine, diagnosis, and treatment of disease.

(iii.) Another illustration of Harvey's speculation, and forecasting of ideas, comparatively new to us, but occurring to him as the result of his observations on the mysteries of generation, will have special interest now. "Let physicians cease to wonder (he says) at the manner in which epidemic, contagious and pestilential diseases scatter their seeds and are propagated to a distance through the air, or by some 'fomes,' producing disease like themselves, in *bodies of a different nature*, and in a hidden fashion, *silently multiplying themselves by a kind of generation*, until they become so fatal, and, with the permission of the Deity spread destruction far and wide among man and beast; since they will find far greater wonders than these taking place daily in the generation of animals."[2]

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[1] *On the Nature, Causes, and Cure of Nervous, Hypochondriac, and Hysterical Disorders*, pp. 64, 221.

[2] *On Generation*, p. 322.

We seem to hear in this sentence the thoughts suggested by the works of Pasteur, Koch, and many others; and while feeling with them, with Seneca (whom Harvey quotes), and with himself that there is truth in saying "Agents greater in number and of more efficiency are required in the construction and preservation of an animal than for its destruction . . . ;" yet, following Harvey, as he followed Seneca in seeing the analogy between the origin of disease and the processes of generation, we wonder with him as he exclaims, "How long a time is conception to be carried out to parturition—with what labour and tenderness is an infant reared . . . but by what a nothing is it destroyed! It takes an age to establish cities, an hour to destroy them."[1] Such thoughts may lead us to ask ourselves—in face of the recent calamities in Marseilles, Naples, and Toulon—do these visitations give sanction to the law of the "survival of the strongest," which was the idea of the generalisation of Harvey, or "survival of the fittest," which was that of Darwin? Man dies, nations become extinct, but the microbe lives on. His earnest cultivators provide him with change of scene, of temperature, of food, and all possible surrounding conditions; and we may almost fancy that we hear the well-tended, and well-cultivated tyrant singing, to some ghastly accompaniment—

> "Men may come, and men may go;
> But I go on for ever."

(iv.) It is difficult to refrain from giving yet another illustration of the mode and degree to which Harvey had forestalled or prepared the way for one of the greatest discoveries since his own time, viz., that of the reflex action of the spinal cord. In a letter to Horst, written in 1654–5, he says, looking forward to the work of those who were to follow him, and speaking of himself as "not only far stricken in years, but afflicted with more and more indifferent health. . . . I do not doubt but that many things still lie hidden in Democritus's well that are destined to be drawn up into the light by the indefatigable diligence of coming ages."[2] Following up his thought we find him saying, in his *Exercises on Generation*, after distinguishing between the action of the organs of sense, and that of the "sensorium commune," that there are "some actions and motions the government or direction of which is not dependent on the brain . . . that there is a certain sense or form of touch (meaning contact or impression) which is not referred to the common sensorium, nor in any way communicated to the brain, so that we do not perceive by this sense (*i.e.*, impression) that we feel . . . and this sense we therefore distinguish from the proper animal sense. . . ." Harvey termed it a "*natural* sense;" and he continues, "such a sense do we observe in zoophytes or plant animals, in sponges, the sensitive plant, &c." Using the word "sense" with this interpretation he treats of many animals, "who are endowed with both sense and motion without having a common sensorium or brain . . . so also (he adds) do certain natural actions take place in the embryo, and even in ourselves, without the agency of the brain, and a certain sensation takes place without consciousness." After speaking of the difference to be observed between "regulated contractions and relaxations to perform any movement, such as progression or prehension," he compares these movements to "the muscles or organs of motion, when affected with spasms or convulsions from an irritating cause," and points out their resemblance to those of "the decapitated cock or hen . . . the convulsive movements of the legs and wings, but all confused and without a purpose, because the controlling power of the brain has been taken away."

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[1] *On Generation*, p. 322.

[2] *Letters to Horst and others*, p. 613.

The explanation of these movements given by Harvey—viz., that they "proceed from the power of the heart, and depend on it," is certainly not true in the sense in which he intended it, but he gives a most interesting illustration of his physiological insight when he says, "We have an excellent example of both these kinds of motion (animal and natural) in respiration. For the lungs, like the heart, are continually carried upwards and downwards by a natural (*i.e.*, unconscious and involuntary) movement, and are excited by any irritation to coughing and more frequent action; but they cannot form and regulate the voice, nor can singing be executed, without the assistance and in some sort command, of the 'sensorium commune.'"[1]

In another paper Harvey gives an interesting account of parturition in "a young woman . . . in a profound state of coma . . . but in whom the application of a powerful sternutory . . . excited convulsions throughout the body, beginning at the shoulders and gradually descending to the lower extremities. As often as the stimulus was applied the labour was advanced . . . until the child was born, without the consciousness of the mother, who still remained in a state of coma."[2]

A hundred years after these words were written, Unzer developed the idea still further, in his treatise on *Animal Nature in Relation to purely Animal Forces, or Vis Nervosa*; and after him Prochaska in his *Dissertation on the Functions of the Nervous System*, defined accurately the limits of the reflective centre; but it was left for Sir Charles Bell, and much more to our own distinguished Fellow, Marshall Hall, to expound the meaning of these movements; to comprehend and reveal the physiology and pathology of action in the spinal cord; to apply this knowledge to the explanation of many diseases, and to devise means for their control or cure. In doing this he again prepared the way for later researches upon the reflex function, as it affects local circulation, and so rendered possible a knowledge of many of the finest points of neural and vascular action, which we directly owe to the labours of those great workers to whom allusion has already been made, when dealing with Harvey's foresight of that matter. Again, in the passage quoted from the paper on parturition, we find a curious forecasting of the ingenious application of the reflex theory of Hall to the interpretation of the action of the uterus which was made by Dr. Tyler Smith.

In thus sketching some of the motives which led to the event of last year, and also to the fact of our meeting here to-day, it has been my wish to show that we still hold in reverential regard the perishing remains at Hempstead; and also the living force that is with us, now and here; and which comes to us from our knowledge of the individual, Harvey, in his relation to the past, the surrounding conditions of his time, and his outlook towards the future.

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[1] *On Generation*, p. 432, *et seq.*

[2] *On Parturition*, p. 535.

[3] *Vide ante.*

(C.) There is one thing more, however, that this College has done for many years, and that is, by this annual Oration, to hand down to coming generations the memory of him from whom we have learned so much, and to whom our debt of gratitude is larger than we, perhaps, as yet can know; certainly much larger than it falls within the range of my powers to express.

We speak of the "immortal" Harvey, but in what sense? To many, his own words would convey all the meaning of that attribute. "The eternity of things," he says, "is connected with the reciprocal interchange of generation and decay; and as the sun, now in the east, and then in the west, completes the measure of time by his ceaseless revolutions, so are the fleeting things of mortal existence made eternal through incessant change; and kinds and species are perpetuated, though individuals die."[1] True—grandly but sadly true—and yet, our meeting of this day is a declaration that such truth is not universal. Much of his work has become a part of common knowledge; and so, will live on in the lives of those who are the interpreters of Nature, so long as Nature lasts. But the wish that animates us to-day is to hand down to those who follow us some knowledge of the individual to whose life we owe so much, and whose personality we would not willingly let die. There are many ways in which this may be done, but I will allude to only two.

(i.) The names of some great men have been associated with the discoveries that they have made; and they perhaps are used, many of them, in such familiar way that they carry little or no suggestion of their meaning. In some generation or two, yet to come, may it not be that the etymology of such words as Fallopian tube, Meckel's ganglion, Bright's disease, Addison's disease, Corrigan's pulse, galvanism, faradism, an ohm or a volt will have become somewhat obscure? Or, if the meaning of such phrases may be found in lexicons, are there many who will try to find out those meanings? It seems to me probable that individuality will not be maintained by such means; and that future students may sometimes be disposed to ask—as I once heard the question put quite seriously—whether or no the "Portal vein" was not named after the distinguished French physician Portal?

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[1] *On Generation*, p. 226.

While the progress of science is constructive of generalisation and so-called "laws," it is destructive, as Harvey says, of the individual life; but yet we give names to organs, functions, forces, and shrewd connotations of phenomena, in order—while finding them convenient at the time—to delay if not arrest, the disintegration of the work of those men, whose names we thus hand down to those who follow us.

Do we not think it probable that, as future research proceeds, some of these names—which have passed into many countries and many tongues—may be lost sight of, and be so decomposed that they pass out of common use?

At this hour, and still in the lifetime of our honoured president—whom may God long preserve—the phrase "continued fever" has passed into practical disuse; and this has been due, mainly if not exclusively, to the industry and genius which led him to disintegrate the name, trace out the causes, and define the maladies, that have long passed under that common term.

(ii.) Again, there are certain days by which the memory of great men is perpetuated. From very olden times until now, and from the far east to the far west, days are set apart for the purpose of recalling individual lives. Ceremonies of all kinds have been parts of these human, national and instinctive acts. They begin in the smallest families with the birthdays and they stretch out to the acts of the greatest nations.

This is St. Luke's day, in the calendar of millions. There are days still set apart, compared in antiquity with which the observance of St. Luke's day is but a modern event. Two hundred and eighty years have passed since Harvey was a member of this College; for two hundred and fifty-six years his great work (*De Motu Cordis et Sanguinis*) has been before the world; two hundred and twenty-seven years have elapsed since he was buried in the quiet little church of Hempstead. And yet only one year has passed since this College removed his remains still "lapt in lead" from the vault in which they had lain so long, and placed them in the safer keeping of new and carefully selected marble.

With us although it is not so named, this is "Harvey's day," and three hundred years have passed since he was born. How long this commemoration will continue we cannot tell. Our knowledge of the future, if we have any, is but scant. Who knows whether, when another sixty-nine years have passed, "Waterloo Day" will be kept in memory of Wellington?

No one can answer us in our questions, but this we may do, we may look to the past, and learn its lessons; we may look to humanity and read its instincts; we may read the record of this College, and know its feeling; and of this we may be sure, that, although Harvey's name may be unknown to many in the days to come, yet—so long as disease lasts; so long as the movements of the blood form part of the study of the physiologist and the art of the physician; so long as any further light is to be thrown upon them, by cardiograph or sphygmograph, or by any as yet unthought-of method of investigation; so long as "the circulation" is a recognised fact of science, his work will live; and although much of it may lie hidden in the "common notions" of the future, yet the life of Harvey will be maintained, in its integrity, by the future fellows of this College; and the greatness of his character will be brought, again and again, to light by many who will, more adequately than I can do, discharge the duties of this day.

It has been my wish, in what has hitherto been said, to lay before you some explanation of the motives that bring us together now; and also of those that led this College, last year, to the grave of Harvey. But further—

II. If we would now appreciate the work of Harvey, let us for a moment try to eliminate from our knowledge the fact of "the circulation of the blood;" and then imagine ourselves to be face to face with the diseases that we are daily treating: with fever, apoplexy—hæmorrhagic, embolic, or diathetic; with dropsy, with cardiac disease—recent or old with degeneration of structure, or with functional derangement. It requires some force of fancy to realise what would be our position. The thermometer might teach us much; but it is difficult to see in what way either stethoscope, cardiograph, or sphygmograph could do other than augment our bewilderment. Those who have made out for us the meaning of the cardiac sounds; those who have skilfully constructed apparatus so as to make the heart itself record, in some fashion, its own marvellous movements; and those who have delineated, in some sense, the curve and time-ordered elements of the radial pulse, would all admit that their work was based upon the foregone conclusion, the accepted fact, that the blood moved onwards in a circle. They have attained to knowledge that Harvey could not reach; but, let me ask, could they have known what they do now, unless Harvey had raised the platform upon which they stood? "The thoughts of men are widened by the progress of the suns;" and, by slow degrees, others might have done the work, or made the discovery, that he made; but the effect of his energy was a grand upheaval of the crusted surface of the past; a Titanic throe, that brought to the birth a new and mighty force and fact; and, when some of the dust and boulders had been cleared away, placed all who followed him on a higher plane, and in a clearer light.

It is given to the few great men to save the time and labour of the many. They not only take strides that would be impossible for those of lesser build, but they carry with them —over the bridge that they have thrown across the great gulf between the question of yesterday and the answer of to-day— all those who have eyes to see, ears to hear, and hearts to follow.

III. Next, let me bring before your notice some of the main features of Harvey's character, as this displays itself in his written work. Chronologically, his character must precede his work; but the former was developed by the latter. These things act and react; moral forces become greater as our toil grows harder; and, in so doing, give not only fresh impulse, but increased strength for work.

(i.) Throughout Harvey's writings there is an eminently religious tone; a devout and reverential recognition of God; not only as the great primal, ever-acting force, behind, outside, and before all the works of Nature; but as the Being, "the Almighty and Eternal God," to whom, as he says in his last will and testament, "I doe most humbly render my soule (as to) Him that gave it; and to my blessed Lord and Saviour Jesus Christ."[1]

But Harvey did not let his religious convictions hold him in the tight grasp of what has been termed the "theologic stage" of development, nothing prevented him from seeing all that he could see, and frankly telling all that he believed: and so we finding him spurning some of the figments about "the spirits . . . of a sublime, lucid, ethereal, celestial, or divine nature," when they are employed to fill up gaps in the physiology of his day; and comparing those who use them "to the vulgar and unlettered who, when they do not comprehend the causes of various effects, refer them to the immediate interposition of the Deity."[2]

Harvey, although saying that "the Divine mind of the Eternal Creator, which is impressed on all things, creates an image of itself in human conceptions;"[3] and again that "all the arts are but imitations of Nature . . . as our religion or understanding is a derivative from the Divine intelligence manifested in His works;" and still further affirming as follows —"wherefore, according to my opinion, he takes the right and pious view of the matter, who derives all generation from the same eternal and omnipotent Deity, on whose nod the universe itself depends:" yet shows his freedom from theologic dogma, and his wide range of thought in adding, "nor do we think that we are greatly to dispute about the name by which this first agent is to be called or worshipped ; whether it be God, nature, or the soul of the universe—whatever the name employed—all still intend by it, that which is the beginning and the end of all things ; which exists from eternity and is almighty ; which is author or Creator, and by means of changing generations, the preserver and perpetuator of the fleeting things of mortal life ; which is omnipresent, not less in the single and several operations of natural things than in the infinite universe."[1]

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[1] *Will of Harvey*, p. 89.

[2] *On the Circulation*, p. 120.

[3] *On Conception*, p. 582.

We are reminded by this passage of the well-known dialogue, in which Faust, to Margaret's examination of his creed, says—

> "Call it whate'er thou wilt—heart, love, or God,
> Or happiness !—I cannot give it name."

And the fair Margaret makes answer—

> "All that is very good and true ;
> Nearly the same the Priest says too,
> Only in somewhat other words than you."

Harvey recurs to the same theme, and after saying that "the most perfect man, whose highest excellence is that he knows himself ;" adds "we ourselves, as is seeming in these days (hold) as the Almighty first cause of all things . . . the Creator and Father of all that is in heaven and earth, on whom animals depend for their being, and at whose will and pleasure all things are and were engendered." [2]

"It is true," said he, in conversation with Dr. Ent, "the examination of the bodies of animals has always been my delight ; and I have thought that thence we might not only obtain an insight into the higher mysteries of Nature, but there perceive a kind of reflex of the Omnipotent Creator himself." [3]

(ii.) If Harvey, though a devout believer in God, was yet free from all the restraints of the so-called "theologic stage;" he also, although a learned and keen metaphysician, had escaped from the trammels of what has been termed the "metaphysic stage." He had cast them off with as much ease as Samson his green withes. He meets the metaphysician on his own ground with clever dialectic; but he pours contempt on those "who advocate incorporeal spirits, having no ground of experience to stand upon," adding that "their spirits indeed are synonymous with powers or faculties, such as a concoctive spirit, a chylopoietic," &c. And, before this, with regard to the nature of "the spirits," he says: "there are so many and such conflicting opinions, that it is not wonderful that the spirits, whose nature is thus left so wholly ambiguous, should serve as the common subterfuge of ignorance. Persons of limited imformation, when they are at a loss to assign a cause for anything, very commonly reply that it is done by the spirits: and so they bring the spirits into play upon all occasions; even as indifferent poets are always thrusting the gods upon the stage as a means of unravelling the plot, and bringing about the catastrophe."[1] Harvey did not base his conclusions upon *a priori* metaphysics, but on solid facts.

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[1] *On Generation*, p. 370.
[2] *Ibid.* p. 402.
[3] *Epistle Dedicatory*, p. 146.

(iii.) If it be asked what was, then, his position; and what was the method he employed?—my reply is that he being one of "the freemen whom the truth makes free," held the position of an observer, a questioner and interpreter of Nature.

In the letter, by which he dedicates to the President and Fellows of this College, his Anatomical Disquisition on the Motion of the Heart and Blood in Animals, he declares himself "the partisan of truth alone,"[2] and throughout all his writings that follow he never swerved from the position he had taken. To him virtue, as has been well said by Emerson, "lay in the adherence in action to the nature of things; and the nature of things made it prevail."

The intense love that Harvey felt for Nature led him to choose her as his constant companion, and his guide in the search for truth. There was nothing that she could show him that was too great for him to attempt to understand; nothing too small for him to pass by, or to regard with other feelings than those of affection, of reverence and wonder. The teaching of Nature was to him absolute in its authority. "The facts cognisable by the senses," he says, "wait upon no opinions, the works of Nature bow to no antiquity; for indeed there is nothing either more ancient or of higher authority than Nature."[1]

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[1] *On the Circulation*, p. 115 *et seq.*

[2] *On the Motion of the Heart*, p. 7.

Harvey observed the facts before him—and he had eyes to see;—but, not content with the experiments prepared by Nature, he made new facts, by his skilful manipulation of the materials that were lying at his hand; and thus he asked pertinent questions, and obtained their answers. He thought about all these things; he reasoned upon them all; he sought and found all the help that metaphysical method and learning of the schools could render him; and, then, he became their "Interpreter."

His mode of progression may be defined as "longitudinarian," if I may use a word, coined some years ago, in opposition to one very familiar to us all—*i.e.*, he looked and worked straight from end to end. His line was the shortest one that he could draw between the simplest—the first—fact observed and the most remote object of his gaze. He thought in a straight line; he never swerved in his forward march; as he passed onwards, he saw things outlying, on bypaths, but his own force of movement dragged them into his own well-chosen course, and he made them help him on his way. Arrived at his goal, he arranged his materials with care, and proceeded to explain their meaning by a simple inductive process. But, still keeping the same point in view, he approached it from other sides. Sometimes his lines, although converging, did not meet at the point he quite expected. Here his power of thinking outside of, and beyond the facts, came to help him; he made new observations, new experiments, and at last focused them on a point made bright by the rays of his own genius. Dr. Ent spoke but the truth when he said to the President and Fellows of this College, "Our Harvey rather seems as though discovery were natural to him; a thing of ease, and, of course, a matter of ordinary business; though he may nevertheless have expended labour and study on his works."[1]

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[1] *On the Circulation*, p. 123.

(iv.) Harvey made use of working hypotheses; but he never confounded them with either facts, inductions, or laws. He claimed in one of his ingenious theses the liberty which he willingly yielded to others, "to put forward as true (in matters full of obscurity) such things as appear to be probable until proved to be manifestly false;"[2] and after demolishing many theories of others, "prayed for a place" for his own "conjecture until something certain should be established in the matter."[3]

(v.) If some fact, apparently opposed to a truth that Harvey believed himself to have established, confronted him in his way, he rode over it, with a force that could only come from the momentum that his strong conviction had given to his movement onwards. For example he says, "There is one experiment which I would have every one try who is anxious for truth, and by which it is clearly shown that the arterial pulse is owing to the impulse of the blood. Let a portion of dried intestine . . . be taken and filled with water, and then secured at both ends like a sausage; by tapping with the finger at one extremity, you will immediately feel a pulse and vibration in any other part to which you apply the fingers, as you do when you feel the pulse at the wrist." After referring to the manner in which such percussion may be made of use in distinguishing between air and fluid in the abdomen, he continues—"having brought forward this experiment I may observe, that a most formidable objection to the circulation of the blood rises out of it, which, however, has neither been observed nor adduced by any one who has written against me;" and then he falls back upon his observations which show that, in spite of this seeming difficulty, the circulation has been proved. He says that he had "already satisfactorily replied to this difficulty;" and such is true, inasmuch as he had pointed out that all the blood did not pass through the vessels, but that some of it was destined for nutrition; he had spoken of the contractility of the arteries, and of the impulse wave; but his solution of the difficulty, that he himself alone had seen, was founded on his confidence in the truth of his main assertion.

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[1] *Epistle Dedicatory*, p. 149.

[2] *On Conception*, p. 577.

[3] *Ibid.* p. 580.

(vi.) Boldness was a great feature of Harvey's character, when he told any of the truths he knew. "It were," he says, "disgraceful . . . with this most spacious and admirable realm of Nature before us . . . did we not take the reports of others upon trust. . . . Nature is herself to be addressed; and the paths she shows us are to be boldly trodden. . . ."[1] And again, at a later period, he writes: "The doctrines inculcated on the subject of the humours, and which, as being entertained by the ancients, Fabricius regards as certain truths, requiring no further proofs, are inconsistent and false."[2]

(vii.) But Harvey, although bold and strong, was meek, cautious, and polite. He preferred "being wise with the few . . . to going wrong with the many . . ."[3] Dr. Ent, in conversation with Harvey, said to him: "You yourself, I well remember, informed me once that you had never dissected any animal—and many and many a one you had examined—but that you discovered something unexpected, something of which you were formerly uninformed."[4] He was "greatly afraid lest he might be charged with presumption, did he lay his work before the public at home, or send it beyond seas for impression . . . unless (as he says) I had first proposed its subject to you (the President and Fellows of this College), and had confirmed its conclusions by ocular demonstrations in your presence, and had replied to your doubts and objections, and secured the assent and support of our distinguished President."[5]

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[1] Introduction to *Exercises on the Generation of Animals*, p. 153.

[2] *Of the Humours*, p. 557.

[3] Introduction to *Exercises on the Generation of Animals*, p. 152.

[4] *Epistle Dedicatory*, p. 146.

[5] Dedication to R.C.P. of *Thesis on the Motion of the Heart and Blood*, p. 6.

Perhaps it might be well if a similar submission were sometimes adopted in this nineteenth century. But so much has been added to what is called our scientific literature during the third quarter of this century and its now current fourth, that, perhaps, no officer of the College will thank me for the suggestion.

(viii.) Harvey fully realised the value to be attached to the "conclusions to which others had come who had looked" at facts for themselves; but he adds, "he who truly desires to be informed . . . must be held bound to *look for himself* . . ." for "it is our duty to approve or disapprove, to receive or reject, everything only after the most careful examination . . . to examine, to test whether anything has been well or ill advanced, to ascertain whether some falsehood does not lurk under a proposition . . . it is imperative on us to bring it to the proof of such, and to admit it or to reject it on the decision of such."[1]

(ix.) In much of his writing, Harvey was both humorous and eloquent, and he could exhibit high indignation when he dealt with his detractors, yet "to return evil speaking with evil speaking" he held to be "unworthy in a philosopher and a searcher after truth." The passage, however, that follows this, shows that Harvey could (as Sir Anthony Absolute did), if he were tempted to do so, use "strong language;" for he comforts Riolanus by assuring him that "it cannot be helped that dogs bark, and vomit their foul stomachs, or that cynics should be numbered among philosophers; but care must be taken that they do not bite or inoculate their mad humour, or with their dogs' teeth gnaw the bones and foundations of truth:"[2] but we must remember that this was not said *to* his detractors, but only *of* them; said to his friend Riolanus; and, moreover, it was said in Latin, and that makes all the difference!

But with the exception of a few scattered passages of just wrath, Harvey was always dignified, lenient, and calm. He was, as his contemporary Ent said of him, "beyond all praise," and it may be justly repeated of him, when regarding the strength and gentleness of his great heart—

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[1] *On the Circulation*, p. 131.

[2] *Ibid.* p. 110.

> "He has outsoared the shadow of our night,
> Envy and calumny, and hate and pain;
> And that unrest which men miscall delight,
> Can touch him not and torture not again."

He acquired fame, which certainly was not to him "the spur" that might his

> "Clear spirit raise
> To scorn delights and live laborious days."

It may be, as was said of others in his day, that it was the "last infirmity of noble minds," but it was not so with our illustrious Harvey. "Think me not eager," he says, in one of his Introductory Letters (*On Generation*, p. 166) "for vainglorious fame rather than anxious to lay before you observations that are true, and that are derived immediately from the nature of things." Truth was what he sought, and what he found; and if fame went with him, and followed him to his grave, and waits upon him now, there was no seeking for it on his part; nor could he well have imagined, with all his force of fancy, such a tribute to his memory as that of last year, in the churchyard at Hempstead.

(x) Harvey's great achievements were the result of his method—viz. that of observation and experiment. Nature displays much—the "heavens declare the glory of God"—and she is always revealing as she moves, and she is never still; but Nature is ever moving onwards to some unknown goal; and at each onward step she, while revealing, hides,—leaves behind her in her wake, something of the past, which now we cannot see, and presents new facts and new combinations for man—one of her factors—to interpret.

Harvey was one of her keenest and most devout interpreters. To him, as he stood by and listened, the Nature-spirit sang, and with profoundest meaning—

> "So work I at Time's rushing loom,
> And weave the living robe of God."

(xi.) In reverence Harvey knelt before her; but not satisfied with what he saw and heard, he asked her questions—and this with no notion of confusing her, or misreading what she had already said or written—for he was just the kind of questioner to ask the kind of question to which she readily gave answer.

He examined her "in chief" to find out the *right:* he "cross-examined" her, but in no unfriendly tone, to bring her answer to a "yes" or "no," and so disprove the *wrong*, the untruth which other questioners had placed in evidence.

"Nature," said he to Ent, "is the best and most faithful interpreter of her own secrets; and what she presents either more briefly or more obscurely in one department, that she explains more fully and clearly in another. . . . Truth," he continues, "scarce wants an advocate." Nature to him was a perfect verity, the one witness that could never be abashed or shaken; the one witness in whom there could be no false way; the one witness who could not lie.

There was no need to put her "on her oath," for she, in her prime, had been adjured, by the Most High God, to tell "the truth and nothing but the truth.' This she has always done, is doing now, and will, as we believe, go on to do.

But can she tell "the whole truth?" Will Nature ever tell, or teach, us this?

I cannot presume to answer the question which yet I dare to ask; but my own conviction is, that she neither will nor can do this thing until the last hour of Time has struck, and has ushered in the dawn of that one, long, clear, eternal day, whose "sun shall no more go down," and in whose ever-growing light we may hail the presence of that

"Far-off Divine event,
To which the whole creation moves."

THE VALUE OF COMPETITION:

Being an Address to the Medical Students of University College, Bristol. Delivered on Prize-day, May 18th, 1885

PROFESSORS OF THE FACULTY OF MEDICINE, LADIES AND GENTLEMEN,—First of all, let me express, for you and for myself, our heartiest congratulations—and that means "rejoicing with those who do rejoice"—to those who have been successful to-day. This not only because of the prizes that they have gained—although these are good things in themselves, and to be highly valued both now and hereafter—but because they are marks of good training and tests of strength. There are three things that success in college competitions, or I might say more generally that college competitions put to the test, which it is well to have tried, and that in good time, for they will furnish much guidance for after-life. They may be put thus: (1) *strength* both of body and mind, and upon that depends much of what people regard as "temper;" (2) the *method* of study; and (3) the *capacity* for reproducing, when wanted, the knowledge and the skill that you have acquired. There are two classes of men, especially marked from one another, who compete for prizes; and, as an old examiner in university and in college, you will let me tell you that they are generally quite easily distinguished from each other, and this in both their "written papers" and in their *viva-voce* answers to the questions that may be submitted to them. There are great and numerous varieties in the style of answer, but no practised examiner can fail to recognise the difference between the two classes of men that I have mentioned. In the one, the man has been working for the pass or the honour that he wanted to obtain ; in the other, the man has been working to gain the knowledge which makes that pass or that honour well-deserved. Men of either class may obtain their reward ; but the reward of the one is of far higher value to himself and to others than is that of the second, which may sound the same ; but yet be something that neither he, nor others, will care for, when a few months have passed. Before I say a few words of congratulation to the unsuccessful, or rather, to those who have run, but " have not obtained the prize," let me, as a much tried-examinee, as well as examiner, take this occasion to remind you, both prize-takers and prize-losers, that the element of chance is not without its influence in either pass or honours examination. It is as easy to exaggerate as it is to underrate this factor, but it should always be borne in mind. Let no failure be referred to it alone ; let no success lead you to ignore it.

How it may be in this school of medicine I do not know, but in many schools, both metropolitan and provincial, those who enter upon competitive examination are in a small minority ; and of this I am quite sure that the majority, composed of those who never try their strength until they face a court of examiners for a simple pass, deprive themselves of one great and highly important element in their education. If all students practised themselves in the art of expressing themselves well in both written and oral examination, a very much smaller number would, when they come before the examining boards, be referred again to their studies. No man, until he has tried it, knows usefully how to write the answer to a question without note or reference-book at hand, or to answer swiftly and to the point, *viva voce*, a question suddenly put to him, and the character of which he did not in the least expect. To those of you who have not been so successful to-day as you could wish to have been, let me say this, that most likely you have gained for yourselves something better than a prize. You have learned why you have failed and such knowlege is of vast importance. You—for men at the same school are very sharp critics and judges of one another—know why others have succeeded and why you have not.

Think back for a moment upon the three elements in successful competition—those I mentioned a few moments since: (a) *strength* and tone of feeling with regard to study. Some are what may be called languid. They do not use all the power they have, sometimes only a small fraction of it, which they may deem quite sufficient for the occasion. This may be either from flaccidity of moral fibre or from overweening self-confidence. On the other hand, there are some who are over-anxious, and their work is done under a dominating feeling of the fear of failure; and their feeling is often the unwilling father to the fact. This often leads to (b) an error in the *method* of study, and the greatest of all errors is this: to make the passing of an examination the object of your work, and to substitute it for the mastery of the matter you want and ought to obtain. Work done in this frame of mind is invariably and in the main bad work. If it should end in some success, it may lead to "vanity;" if it fails, it carries with it only "vexation of spirit." Again, in referring to (c) the *capacity* for reproducing, when wanted, the knowledge that you have already acquired, let me remind you of the presence of two great factors in that which constitutes what is habitually termed a good memory. There is (1) the storage of information, and (2) the faculty of finding what you have stored. Individuals differ widely in the degree to which they are naturally endowed with these faculties, but each may be increased by education. The first depends mainly upon your power of attention, the second upon the orderly manner in which you arrange the materials in your possession. If you try to add to your stores when your power of attention is weakened, you will send one thing out of your head while you are putting another in, and your brain, like an overcharged popgun, will sometimes lose both shots. By no amount of clever manipulation can you put anything more into any created thing than its capacity can hold. If you pack your carpet-bag to the full, and then jam in something else, the probability is that you cannot lock the bag:

you have hurt it or torn it somewhere, and have lost something that you much wished to keep, and probably much more valuable than the last trifle of your " cram."

Then think, again, of what it is to pack carefully—*i.e.*, with attention, arranging with foreknowledge of your requirements what you will want first, second, and last, and contrast this with the unordered heaping of things together in a limited space, the impossibility of catching what you want, and the certainty of finally finding that you have, metaphysically, to turn yourself inside out, and, like a startled parrot, to pour out in unmeaning succession all you know and all that you can say. So, then, if you would have a good memory, pay attention and be orderly. Practically cultivate these two capacities, and so by concentrating your attention on a sound (it may be stethoscopic), on a something to see (it may be microscopic); but do this with both ears and both eyes open; follow through a symphony in the full rush of sound a single strain or a single instrument, while hearing all the rest; see all that you can see in a landscape, but single out something that you must look for to see at all, and so raise to its highest degree your attentive power.

And so with recollection. Put all things in order, and then close your eyes and ears, and recall all that you have stored, where it is, what it is, why you place it in this or that other place, and how you may most easily find it—and that will be very often—in the dark.

Speaking to all, I would say, generally, that if we have regard to the three points laid down, pay due regard to the element of chance, and then add that unknown quantity, the x, y, z, of college life; successful and unsuccessful will find that unknown quantity to be very small, and will be able to explain to one another—as they should always be most glad to do—why the race has not more frequently ended in a dead-heat. A single success or failure, be it ever so great, may be the result of the merest chance, but progressive success or failure, year after year, takes them altogether out of the chapter of accidents, and should be the careful study of all. Regard prizes as milestones not as goals. They may tell you how far you have travelled, how far many are before you, and how far many are behind, and then explain to yourself by careful thought and inquiry why you are where you are. The prize tells you how much you have already attained ; but if it does not tell you also how much more you have to do, it has taught you little.

Before I leave this subject, let me say to you in Bristol what I have often said to my pupils in London, that, so far as my knowledge extends, there is nothing laid down by our great examining bodies which an ordinary student, without either genius or fag, could not pass through with perfect ease if, and it is an important "if," he will only go on steadily and systematically at his work. The strain for honours has often broken men down, and they have to rest and lose their time, and not rarely miss the pass that they might have readily obtained. Most thoroughly do I admit the differences in degree of capacity for honour taking among all sorts and conditions of men. No one could doubt the existence of a genius any more than he can that of an utter fool ; but I think that if *in medio tutissimus ibis*, you will find the majority by your side. So let me add a word to some who work too hard—*i.e.*, try to do more than they need to do, and, moreover, trouble themselves about it a thousand times more than they ought to do ; and I allude to many scores who have broken down in the very faculties they most sorely needed, and to whom I have had to say, "you must go away and rest," remembering, then, as Shakespeare says—

> "As surfeit is the father to much fast,
> So every scope in the immoderate use
> Tends to restraint."

And now let me tell you that when you have finished here, and have satisfied college, university, and hall, your real examination begins, and it is one that will last for life. Your examiners will be your patients and your patients' friends, and you will find them not more lenient than those you have already passed. But the same qualities which have helped you now, and until now, will be your helps hereafter in the daily toil of practice. First, you must hold in due regard your strength and temper. "Never," as Edmund Parkes said, "think of your life, but always of your health, which alone can, make life useful." You will find much to try, disappoint, and vex you; but you must be firm and of good courage, and you must show your patience when those who like drowning men had clutched at straws in their hour of agony, being safely on the bank through your energy and skill, give you nothing but a cold shoulder, or grumble at your fee. There is, always remember, another side to this. To many you will be friends for life. There will be homes which will become homes to you, and no event, from the cradle to the grave, will be left unchronicled in their hearts and yours. This, second, will depend mainly upon yourselves and how your way of work has helped or depressed them. You cannot solve the problems of the sick-room in one quarter of your cases by stethoscope, thermometer, or any such like means. It is by knowledge and sympathy that the help is given. Like good actors, you must so throw yourselves into the mental and moral condition of those with whom you have to deal that you think their thoughts and feel their feelings, and so understand their wants and try to fill them. Again, third, your knowledge and your skill must be always ready, not lying in dust-covered books upon your shelves, but always at your fingers' ends.

Success will mainly depend upon yourselves. If it is true that the poet is born, not made, that dogma is quite as true with regard to the physician. You must be men that your patients and their friends can trust, and do so without knowing it. You must be calm, without indifference; judgmatic, without dogmatism; clear and ready, without rashness; kind, but with both tenderness and firmness. You must always avoid that tenor of mind which I take leave to call "a chronic chorea of ideas." You must go at once and straightly to what you want to say and do, and not let your fancies, your hobbies, and scarcely remembered knowledge come in your way and misdirect the movement you mean to make, or else you will find that "enterprises of great pith and moment" will often "turn awry, and lose the name of action." And here let me caution you against reading much or contributing anything to the ephemeral literature of the day. Hasty generalisation is as easy as it is bad; and many things are being constantly brought forward in societies and pamphlets as great and surprising novelties which you may find well described in such classic works as Watson's Lectures, the monographs of Williams, of Louis, of Walshe, of Frerichs, of Abercrombie, Rayer, and Andral.

Before you enter your profession you should count the cost. There is no great prize in it. Nothing that approximates the prizes to be gained in either the Church, the Bar, the Army, or the Navy. There are no great honours that you can gain. You may receive the kind and degree of reward that is given to the conveyer of a despatch, or to a worthy country mayor who has long voted consistently with his party; but you may not look with hopeful eyes for anything beyond. You may die on the battlefield, or be heavily shotted as you sink into the ocean in the darkness; you may be maimed or killed by a lunatic; or be fever-struck in a workhouse, an asylum, or a gaol, where you are doing work that the country has given you to do. There may, perchance, be two or three lines about you in a local paper, the medical press of London may give a short history of your life. You may leave behind you broken hearts in more than your own sad home; but that is all. There is no adequate recognition of the services of our noble profession granted by either State or country. But there is one thing to which, when your work here is done, every one of you may attain, and this without rivalry of any sort or to any degree. You may, in the solemn silence of your own heart, in that court of appeal into which none but God Himself can enter, after giving thanks for all the goodness you have received from Him, say your "Nunc Dimittis;" and although you may not hear the sob or the unspoken word, yet you will be followed by the unuttered prayer that all bereaved and sorrowing souls know so well, "Requiescat in pace." But I will not close in this somewhat sombre strain, although it has its bright as well as its darker tones. One of our greatest poets has said—

> "The clouds that gather round the setting sun
> Do take a sober colouring, from an eye
> That hath kept watch o'er man's mortality."

But yet, although "the night be dark and dreary," and there may be many "starless nights and cheerless dawns," we must remember that the same great poet said, in another place, when glowing with the enthusiasm of growing life—

> "But for the growing youth
> What soul was his, when, from the naked top
> Of some bold headland, he beheld the sun
> Rise up, and bathe the world in light?"

And so let us, from our point gained to-day, look at what may be in store for some of you, or for some who follow you. What that may be I cannot tell; but yet we may, and we should, indulge the hope that, in that universal light—it may be far, far away in the future—some one will live to see the future Edward Jenner, who may have saved, as his great predecessor had done, millions of lives from misery and death, placed somewhere in a niche of honour in his own country instead of in Boulogne, and not be relegated here, in England, from Trafalgar-square to an obscure corner at the far end of the Serpentine, where nursemaids are engaged in keeping erratic children from falling into its stagnant water.

Imagine the William Jenner of that far-off day, who will have disintegrated the sources of some of our most miserable maladies, and demonstrated, as his illustrious forefather had done, that by deeds of heroic scientific work, such as those now progressing, they are, in the main, preventable diseases. Imagine the future Edmund Alexander Parkes, who shall have lightened every soldier's knapsack, arranged his diet, ventilated his field tent and hospital-ward, and so saved thousands of the lives of England's bravest sons and soldiers: and, yet further, that the John Simon of the coming race, if there should ever be again, in one man combined such science, patience, thought, and self-sacrifice—one who shall, again, have protected our shores from enemies more deadly than any that our battalions or our ironclads can oppose—then, I say, let us hope that it may be seen that, although these great men of the future may care as little as really great men have ever done for the honours that other and smaller men prize so highly, yet that our country may be the better for having placed them where they ought to be, with all the honour and glory that is their due, and which will, let us hope, be gladly awarded then by the heart, the larger heart, of this great and then greater nation.

"Let us then, be up and doing,
With a heart for any fate,
Still achieving, still pursuing,
Learn to labour and to wait."

And not only so, but to work and wait in hope.

SANITARY SCIENCE AND PREVENTIVE MEDICINE

Being an Address delivered before the Congress of the Sanitary Institute of Great Britain at Bolton, 1887.

THE causes of disease, with which preventive medicine has to deal, are so numerous and so various that it is first of all necessary to arrange and classify them in some logical order. This I have attempted to do in the scheme which follows, premising that it is of provisional character only, and may be found useful as a working assistant until something better is propounded to take its place.

I. The division is between those which are inherent in the individual and those which are brought to bear upon him from outside. In the former category are to be found hereditary constitution, sex, age, and temperament ; in the latter all those influences which disturb the balance of income and expenditure of both material or ponderable, and of immaterial or imponderable elements.

Every one has his life conditioned by the former. There is no possibility of eradicating the conditions, or of mollifying them, when once developed in an individual; but their effects may be prevented from becoming disease, by timely recognition and counteraction. Every one, on the other hand, requires for the healthy performance of vital functions, an equilibrium between the income of material—in the form of food, air, and the like—as well as the income of heat, light, and other forces, and the expenditure or excretion, or going out of material, and of energy.

Income may be wrong in quantity, or unwholesome in quality, while outgo may be at the same time defective; and so to the introduction of new poison from without is added retained poison within. It is by the recognition of these causes of disease, and the employment of all our antagonistic powers, that preventive medicine may presume to be scientific in its method, and successful in its results.

The first of the inherent causes of disease is:—

A. Heredity. There are many conditions passed down from one generation to another that are not morbid, such as configuration, height, mental and moral qualities, which are said to "run in families," but with which we have nothing to do here. But there are others which are morbid, and with the influences of which we have to cope, and if possible to intercept. They may be arranged under the heads of (1) redundancy or (2) deficiency of organs; (3) arrests of development; (4) unhealthy conditions of function or structure of particular organs, or systems of organs; (5) disturbances of the whole body, diathetic, constitutional diseases, the tendency to which does or does not show itself until different epochs of life when specific trophic changes occur; and (6) special proclivities to "take diseases" coming from outside; and conversely, insusceptibilities of analogous kind, which latter cannot be regarded as morbid, but which sometimes prove traitorous if relied upon too implicitly.

Speaking generally the power which the physician has to diminish hereditary disease lies in two directions, (a) the forestalling of morbidity by the prevention of ill-assorted marriages; and (b) the special guidance of tainted children, by all measures that can be used or devised for the purpose, by controlling moral, mental, social, and physical education, and regimen of life. This must be commenced before birth, continued in the nursery and schoolroom, and maintained during manhood, and even to declining years.

(a.) Marriages of consanguinity, even when there may be the very rare event of freedom from all taint on either side, are well known to become, in the second, third or fourth generation, the source of much deformity and misery; and this in spite of all special statistics to the contrary. Marriages of consanguinity unfortunately "run in families," and so intensify the evil; and they are doubly difficult to circumvent, first because of the primary basis of their contraction, and then because the poor creatures thus produced are specimens of Nature's workmanship in its most untidy mood; features have rarely been duly chiselled; the sense of beauty has long been dead, while gauche figures and manners often render the victims little short of repulsive to all but those who, born under like conditions, have their faculties of perception so maimed and blunted that they know no better and are also debarred by their own defects from making any higher choice.

This is but a feeble account of what occurs too frequently when some distinct hereditary taints do exist in a family, and where marriages among its members have been permitted. Definite disease, as well as deformity, is the too frequent result; and the result is both persistent and aggravated until, happily, sterilisation may set in. No one can doubt the power of "artificial selection" in the production and perpetuation of advantages and peculiarities that may have been accidentally or artificially brought about. No one can doubt the force of "natural selection" along the lines of utility and the most consummate art; and no one can fail to see, that there exists in man the power to modify the race to which he belongs; and acting up to his highest light, in all paths of knowledge, to use his art to diminish or destroy that which has within it, at its beginning, the seeds of its own inherent decay, being assured that if he does his work well, Nature will internally perform the rest. Conversely, every change, accidental or inherited, which limits the capacities of life, is liable to become fixed by transmission through successive generations.

(b.) But there are marriages taking place daily, not those of consanguinity, but of unhealthy people, and of those who are actually suffering from developed disease of marked hereditary character, or from as yet undeveloped taint, and this often happens when the taint is very strongly exhibited in other members of the family. Let it be always remembered that hereditary taint, although undeveloped, is in itself disease, and then the grave character of the responsibility of propagating it may be, approximately if not duly, gauged. The function of the physician is to examine carefully, and advise discreetly. He must weigh *all* the parts of the family history—and here he will meet with the greatest difficulty, for often the facts are not known, or when known are either concealed or misrepresented. He must form an opinion of the intensity of the hereditary predisposition in each malady, and also in the family under consideration ; and he must have the courage of his convictions. This may make him unpopular or hated, but he must be strong enough to do his duty, and find, in doing it, his reward.

But it is in a very small minority of cases that preventive medicine is ever called into operation in this early stage. The minority is as small as the majority is vast in which the physician is consulted before disease has advanced into open and obvious activity.

The devices that must be employed to prevent the development or further progress of inherited disease, are as manifold as the affections themselves, and some further insight into the prevalence of the latter may be gained by a simple enumeration of those which are the most familiar. But here let me make two remarks by way of caution. First: there is no disease that has yet been shown to be *always* hereditary in its origin, so that, *e.g.*, when we meet with insanity or phthisis in an individual, we are not, at once, to conclude that it was "inherited" by him because a parent had been epileptic, or a grandparent had died of consumption. A large proportion of hereditary diseases can be traced to no hereditary source in particular individuals, therefore we must allow that, in a large number of cases where the possibility of inheritance is patent, a certain number may have developed the disease *de novo.* Secondly, with regard to many people the anti-hygienic conditions and habits which have led to disease in their ancestors may be persistent as cherished heirlooms, and be effective for mischief now. Especially is this the case with regard to the large group of diseases of the nervous system. There is much more than the mere physical contamination by descent in the etiological conditions of a boy or girl, who may be brought up in constant association with an idle, self-indulgent, hypochondriacal or drunken father; and it is quite impossible to over-estimate the dire misfortune to a girl of being educated by an hysterical mother. No high powers of the microscope are needed to discover the *modus operandi* of the *materies morbi* of the contagium of "bad example."

I pass now to some special examples. The first three, viz: (1) the redundancy, (2) the deficiency; as well as, (3) the arrested development of certain organs afford scope for the teratologist rather than the physician. They furnish illustrations of curious facts in heredity, and in this way ar interesting and instructive, and may be useful. Hare-lip is so often said to result from a mental impression upon the mother, that the sequence of events cannot be confined to the chapter of accidents; the same is true with regard to supernumerary fingers or toes, and these peculiarities are liable to recurrence through successive generations. Observe here that the original cause of the deformity was not hereditary but accidental, and yet that it became hereditary. This question of the hereditary transmission of acquired habits or conditions is still *sub judice*, but to my mind many of the facts recorded by Darwin are susceptible of this interpretation, notwithstanding the very strong evidence afforded to the contrary by the history of the habits of the Mahometans and Hebrews.

(4.) Morbid conditions of function or structure of particular organs or sets of organs, and such as do not affect the *general* health, are very commonly met with, and for some of them much may be done. These may be resolved mainly into organic changes which limit, or derange or destroy, functional activity. (a.) The organs of special sense furnish the best examples of this class. Almost every variety of limitation or perversion of the sense of sight, from slight myopia to absolute anaurosis, seems to run in families. Sometimes the defects are congenital, sometimes they appear in adolescence, and again they may be deferred to declining years. It is in the early recognition of these maladies that the main hope of amelioration is to be found. Ophthalmic science is a growth of our own day, and its powers are now being used for the education and strengthening of the healthy eye; in the timely correction or removal of some sources of deficiency; and the supply of optical instruments to reduce to a minimum the disabilities with which some are born and which others acquire. Whatever may have been the prescience of our forefathers and their skill in surgery, it has been reserved for the latter part of this century to see "the blind receive their sight." And these not only among the favoured few but among the multitude; and still further, not as the result of any painful operation, or in the face of any risk, but simply by adding to a profound and scientific knowledge of the structure and functions of the eye the aid yielded by a mastery of the sister science of optics.

(b.) Deaf-mutism, again, may be hereditary, congenital, or acquired, and some of the most astounding results of training have been witnessed in this field. A congenital deaf-mute, if left alone, becomes as a rule an imbecile; one who has been born with language and hearing but has lost them both in early life, may become the same, if nothing be done to educate him, while the results of due teaching are marvellous. Two boys, brothers, were brought to me at about three and five years of age; they were congenital deaf-mutes and imbeciles, and examples of the same miserable condition were found in other members of the family. A very clever, most patient and persevering tutor was found for these boys, and when the elder was between eleven and twelve years of age he had been taught to read, write, and speak with accuracy.

He could read not only from books but from the lip or from the hand; could articulate very well; could parse a sentence in English and translate it into French or German! There are thousands in this country who have no advantage of this kind, and so they remain to the end of their days mere vegetating boys and girls, or men and women, a burden to their relatives and a disgrace to the community.

(5.) The fifth group of hereditary diseases is one so large that it seems to include almost all the maladies that flesh is heir to, except those that are the result of direct introduction of poison from outside. They are as numerous as the organs of the body, and as various as the possibilities of change. Such inherited ailments agree however, in their consisting of a general tendency to disturbance of varied functions and structures, and in their becoming expressed in the form of so-called diathetic or "constitutional" disease.

If there are, on the one side, occasional examples of hereditary "nervousness," or simple epilepsy, there are, on the other, tubercle, scrofula, Bright's disease, and others about which it may be truly said, "the whole head is sick, the whole heart is faint, and there is no soundness in it." Yet, even in extreme cases, preventive medicine has its work to do.

(a.) The condition of ill-health most frequently met with in hereditary diseases of the nervous system, is one of undue liability to disturbance;—given in any one of the antecedents of a particular individual, either insanity, epilepsy, hysteria, tendency to excesses, great nervousness, or what not, the outcome may be any other of the maladies mentioned, and not at all necessarily a reproduction of the initial disease. It is by bearing this fact in mind that the physician will see the necessity of being armed at all points. It is not enough to avoid or counteract the tendency to convulsions in the first dentition, the second, or the third, but other diseases such as chorea, hysteria, wilfulness, tricky ways, cruelty, and deceit must be borne in mind. No routine practice will be useful; it is often worse than useless. For example a child of twelve becomes nervous and restless, his father had fits when he was young, and he is an odd man now; some other members of the family had convulsions, an uncle was epileptic, and therefore this is regarded as a case for bromine, a diet restricted to insipid inefficiency, books are to be put aside, school abandoned, the boy petted and pampered at home in the bosom of his family, several of whom are somewhat queer, and so—in spite of bromide and of a redundancy of counsel—he becomes a victim to the very malady from which so much was done with the intent to protect him; and this, be it remembered, and the like has happened scores of times in my experience

The boy was as a rule anæmic, wayward, underfed, and not quite straightforward in his ways, and really required iron, not bromine; good food and plenty of it; the discipline of school, as well as its work; the companionship and the sports of his own sex instead of the petting of his sisters, and little brothers, over whom he tyrannised in secret, and so escaped the thrashing he deserved.

Another illustration of the like mistake is seen often in girls, whose mothers have passed through an early life of indulgent petting into one of hystero-mania, or egomania, and then gradually into that of chronic silliness, self-absorption, and the sacrifice of parent, husband, child, or friend to each and all of her foolish whims. "No one has ever opposed her," "She has always had her own way;" this is what we are told, and therefore she must go on as she has been doing, and her daughter must follow suit. There is nothing the matter with the girl except occasional migraine, from some real or hypocritical fasting, or from sitting up at night without food, poring over a trashy novel. She can sit a horse, but she cannot sit upright in a chair; she can play lawn-tennis, but she cannot walk; she cannot sit out morning church, but she can dance for five consecutive hours. "She is just like her mother," her relatives exclaim; "we dare not thwart her, or she will become as bad;" and so she goes her own ways and fulfils their worst predictions. These are but common illustrations of the fault of thinking that hereditary disease must take its parent form; or of acting upon the presumption that, as the form is the same, there is nothing to be done. On the contrary, much may be done by taking patients from home, and all its evil ways; giving regular employment of a useful sort; exercises of mind and body; fresh air, good food, plenty of rest at reasonable hours, and utterly declining to admit the existence of anything but a slight malady that needs, however, definite treatment, and that of the kind described.

(b.) Of gout, rheumatism, tubercle, scrofula, syphilis, cancer, Bright's disease, and many others, it is only necessary to observe that to be forewarned is to be forearmed; and that, when there may be a strongly-marked hereditary taint, its development into disease may often be delayed or eradicated by timely care. We lose more lives through carelessness than through ignorance. May not the thin-limbed and thin-faced boy, with pink and white complexion, over tall for his age, who easily perspires and passes lithates; whose temperature and pulse run up quickly; who declares that he is very well until some general langour or local pain compels him to give in—might he not often be saved from attacks of acute rheumatism, by careful habits, food, clothing, and medicine, and so spared all the troubles of a damaged heart? We have to look for these things, not have them thrust upon us. The day may be yet distant, but it will surely come when regulated physical examination of the bodies of the young will be as necessary and as common as examination in the Latin grammar, or the multiplication table, or other matters.

(6.) But there is another group of hereditary conditions, not common, but well marked, viz., a proclivity to "take diseases," sometimes of several sorts, sometimes of one only, *e.g.*, such as scarlet fever or whooping cough. The converse condition of insusceptibility cannot be regarded as a morbid condition. Caution as to exposure is almost as important in the one case as in the other, for rashness is not without its victims, and to this allusion has been made already. Many precautions must be taken on behalf of those who have hereditary taint, for the conditions may be multiform which come together to produce from it the fully developed disease. As an example of popular knowledge on this point, I quote a paragraph from the *Times* of September 12th, in its review of Mr. Colvin's recent *Life of Keats.* The writer says, after alluding to the eminently pugnacious character of the poet in early life, "It was not till the hereditary taint of consumption, which had already killed his brother, became developed by the over-exertion of a walking tour in Scotland, that pecuniary troubles, caused by a stupid and stolidly unsympathetic guardian, combined with the hope-deferred of a long engagement to Fanny Browne, and perhaps to some extent the disappointment of literary ambition, fostered a certain morbid tendency of his nature, if the term 'morbid' can be fairly applied to a turn of mind to which literature owes some of its greatest masterpieces."

B. Sex has always found its place among the predisposing causes of disease; and if general etiology were the theme of this address, there is very much that ought to be said regarding it. But as the physician has no power to direct the production of boys or girls respectively, all that preventive medicine can do is to guide the development of each. Organs must be present to take on morbid action, but the *differentia* of sex are far wider than the possession on the one hand of ovaries, and on the other of testicles. The moral, mental, and physical conditions and aptitudes of the two sexes differ; and while civilisation has intensified, through generations, these differentia, the tendency of much recent fashion—I cannot call it civilisation—has been to diminish them; so that we encounter on every hand manly or masculine women and effeminate men. In uttering its protest against this perversion of nature, this devolution instead of evolution of the race, preventive medicine may be of service.

There is nothing to my mind more simply silly than the cant or slang that has been uttered about the "superior" and the "inferior" sex. Each may be perfect in its way, but each is spoiled when it apes the other. In rough conditions of life women have been, and are now, better fitted for physical labour than are those whose very configuration and faculties have been modified by social habits of refinement; and it certainly is not the aim of the obstetric physician, either man or woman, to encourage the development of the "masculine pelvis."

It is worthy of note, here, that it is not the highest qualities of man that young women imitate, but rather, on the other hand, the roughness of the youth, his bravado, and uncouth language; or on the other, the lackadaisical *nil admirari* tone of the pedant and the fop; with, it may be, an occasional dash into imitation of excessive learning, and the habits of the ascetic or recluse. The men who mock women's ways also mock their foibles, not their strength; and lisp and sigh or groan out of their unsatisfied longings in vapid admiration of sentimental nonsense, whether it be in poetry, music, or painting, and find out something "quite too lovely" in a line, a strain, or a daub that no sensible man would care to hear or see again.

The brain of women is not improved by being roughened or over-strained; and the emotional nature of man is enfeebled by this reversal of the order of nature; and we find the tendencies to disease inverted without any advantage to either. The physician may I think, do much in counteracting this tendency of the present day; protesting, on the one hand against all foolish pruderies, mock modesties, and the like; and, on the other, encouraging healthy habits of body and mind, always bearing in mind that the highest type to aim at is the perfection of woman and the perfection of man, and not the production of moral and mental hermaphrodites which, thank Heaven, are usually sterile.

Let it not be supposed that I do other than admire the great strides that have been made of late years in the higher education of women, both for intellectual and practical work. These may be readily overdone, as they are in men, and very frequently the results of over-strain are seen in illness, in incapacity and distress. Their exhibition, however, is less painful than the frivolous inaptitude and idleness of men, who with all social and educational advantages, do nothing, never occupy themselves with any calling or pursuit, but are content to bide or loaf about and live upon their incomes, or their friends, as the case may be. Over-strained women often become sour and cynical, and morbid, as do briefless barristers and unpopular parsons who may have much laboriously gathered learnings in their brains, but no congenial work to do. They complain of like discomforts, diminished brain power, as the favourite expression goes, and entire dissatisfaction with everything and everybody. Under-occupied men become hysterical and silly, and a prey to every form of hypochondriacal misery. It is the highest sphere of man and of woman to be the complement of each other, and to combine in the work of home first, and then of all around us; but the work of the one should be a woman's work, and of the other, "all that may become a man." It is in the imitation of the ways of the other sex that woman becomes repulsive, and man despicable.

With regard to sexual proclivities to organic diseases, there is something for the physician to do in being forearmed. For example, the greater frequency of simple ulcer of the stomach, of erythema nodosum, goitre, exophthalmia, and the like in women ; and of angina pectoris, carcinoma ventriculi, locomotor ataxy, and other maladies in men, may be of service not only in diagnosis and prognosis, but in treatment. There is, however, much that prevention may do by regulating the habits of boys and girls. In healthy exercise, the avoidance of overstrain of muscle and prolonged fatigue ; in wholesome food and sufficient rest ; and in a score of ways many a trouble which might easily become developed into disease may be avoided. Many cases of heart and lung disease originate in the rough games of schools ; many of the troubles of women in their indolent and unwholesome schoolroom and after life, in the follies of their dress and the hours they keep.

C. Age. We know much, but understand little, of the time-ordered events of life. There is an average pulse and respiration time ; there is the incubative period of life as well as of the exanthemata ; dentition, puberty, climacteric changes and decay have their relations, more or less fixed, with time ; and a knowledge of the predispositions attending various ages may be of service in the prevention of disease. In infancy the thermogenesis is low and the capacity for digestion limited to certain kinds and quantities of food ; so that danger lurks in defective clothing, and defective feeding. There is rapid development, and the reflex functions are over-active, so that there is undue proclivity to spasm, not only of the voluntary muscles, but of the vessels ; for spasm may cause infantile paralysis as well as infantile convulsions. Febrile conditions are common, and so are local disturbances of the circulation, such as internal congestions and other forms of congestion not internal, such as chilblains. It is by regard to the nursery, the clothing, the food, and the surrounding conditions of domestic kind, that the physician will ward off much disease.

In dentition—whether the first, second, or third—the nervous conditions which precede as well as accompany the eruption of the teeth must be duly regarded and foreseen, and so many troubles averted before local discomfort of the gums has taken place.

At puberty it is by guiding the *general* habits of the individual, rather than by looking after possible local troubles ; by maintaining a healthy tone of domestic life, rather than by special treatment, that the physician will do his best to prevent disease. We are too often disposed to be looking for some special sign of change, forgetting that change is always going on ; and so, sometimes, we may let golden moments or months pass by unused. The follicle of the wisdom tooth may be found in the embryo jaw ; and many of the evils of all these so-called changes of life, exist long before any special events have made them obvious. Bearing these thoughts in mind we may always see much to guide us in advising those upon whom age is stealing, but who have as yet had no warning that it is so, for they are younger than their years. Those who are older often come quite soon enough but rarely too soon for help. The horizon of thought and work ought to be made smaller when memory becomes treacherous, arteries rigid, and the heart's impulse low. Timely caution, based on facts which only the doctor knows, or from the revelations made to him in his confessional—although carefully concealed at home—might save hundreds of " shocks," or more slowly growing and increasing griefs, when some unlooked-for break-down occurs, and relations and friends exclaim, " This is quite too terrible ; he seemed so young a man, and was only yesterday quite busy at his work, and full of life and schemes." He ought *not* to have been busy at his work.

As in babyhood we are exposed to the wills and whims of others, to carelessness, stupidity, or over-fussing ; to bad feeding, neglect, or exanthemata ; to tumbles, broken legs or other frivolities ; so, later on, when the romantic period of youth—be it for learning or for play—has done its best or worst, and *early middle life* begins, the exposures fraught with danger are those of over-excitement and over-work, and against these the physician knows only too well how much he could do if the patient would but hear and follow. We pass on to *middle life;* sometimes a wholesome table-land, but often a still arduous, too arduous climb, or a slow decadence of failure and dismay; and we see success leading to excess on the one hand, or failure plunging into dishonesty or despair on the other, and here too we must again warn in time; and as the life goes on to its *second infancy*, through an emotional epoch of pitiful weakness, a senile hysteria, the physician has again to use all his care to see that he, who has outlived all those who gave him joyous welcome to his cradle, is yet tended as he should be, and piously cared for to his shroud.

There is no stage of life at which we are not wanted, no age when we are without anything to do, and let us be ever mindful of our high responsibility of foresight, being assured that in the vast majority of instances we, in spite of many prejudices, shall find ready adjutants thankful for any hints that we may give; and, by doing our work well, be spared having to frame an answer to the terrible question, sometimes quite fairly put, "Why did you not tell me this before?"

D. Temperament is a word more frequently used than analysed; and although its striking forms are known to all, it sometimes happens that its influence on the tendency to disease is disregarded until the disease is brought about. The physician, however, should be on his guard, and try to prevent the *sanguine* youth or man from relying too complacently on his energy—which may not always mean strength—and to protect him from the consequences of undue hopefulness, carelessness, and from many troubles he had not in the least degree anticipated. On the other hand, the *phlegmatic* may have their morbid proclivities lessened or removed by timely warning, and rousing to a sense of duty; while the *nervous* may be strengthened against their trouble by the wise counsel of the physician, who may have the art of obtaining confidence and speaking with authority.

II. I come now to the second great group of "causes of diseases," to which I alluded at the outset, viz., the disturbances of the equilibrium or balance between the necessary elements of income and expenditure, whether these be of matter or of force. It is absolutely necessary for health that we should take in certain things and forces, and that we should give out others. It is also essential that what we take in should be wholesome and conducive to healthy life.

This range of subjects is so wide and varied that I can but enumerate some of them, and point out, generally, wherein the physician can act in the prevention of disease.

A. Income is both material and immaterial, or ponderable and imponderable ; we need food and air, light and heat on the one hand ; excretion of material, and exertion of nerve and muscle on the other. These should be balanced, or we are not in health.

(1.) The *income* of matter involves all that is included under the head of "food," solid, liquid, and gaseous,—which may be either defective or excessive in quantity, or wrong in quality. The absence of certain elements, such as vegetables for example, has its entail of scurvy ; while deficiencies of either the albuminous, amylaceous, oleaginous, or saline elements produce their specific morbid changes. Deficiency of food of all kinds is often, too often, sadly the cause of multiform maladies ; associated, as it almost invariably is, with other anti-hygienic conditions, such as over-work, over-crowding, and intemperance. Excessive feeding on the other hand, which at last brings its own remedy in loss of appetite may on the way to that stage, produce a hundred maladies of every organ in the body.

But the great source of disease, against which preventive medicine has shown its strongest powers, and with which it now wages war most vigorously and incessantly, is the introduction of noxious matter either with food, by the air we breathe, or by direct inoculation.

The appliances of science have done much to diminish the evils that arise from the metallic or other poisons, such as lead, mercury, antimony, steel, phosphorus and the like ; and the mode in which good has been obtained is by the prevention of their entry into the organism, and also by rendering assistance in their excretion. In like manner those more subtle poisons, which are the physical bases of all zymotic diseases, are to be robbed of their power for mischief mainly by being kept out of the body. The physician has found out the sources of many of these poisons, as well as the modes by which they enter the body, and having done so has devised means for their arrest. The *materies morbi* has been separated from much that had surrounded it, and measures for its modification or destruction have been discovered and applied. Our knowledge of the definite importation of cholera, typhoid, and more recently of some outbreaks of scarlet fever, by means of water and of milk, and further, the knowledge that by simply boiling these fluids the poisonous material is deprived of its power for mischief, affords grounds for hope that, by increased observation, the sources of other maladies may be found, and means for their destruction be devised.

The magnificent results that have been obtained and demonstrated with regard to vaccination and variola have stimulated the zeal of many enthusiastic workers, and raised—as almost all beneficial discoveries have done before—a perfect tempest of opposition, misrepresentation, and frivolous and irrelevant talk. The questions of syphilisation and of inoculation for rabies must be regarded as still *sub judice*, but a sufficiently strong case has been made out in regard of both these poisons, not only to justify, but to demand further inquiry.

(2.) There are certain imponderables, such as heat, light, and electricity, that we require for healthy life, and a deficiency in the income of which is the frequent cause of disease.

(*a.*) We all need external warmth, and at the extremes of age the need is greatest. Many follies of habit may be rectified by the physician, even although in some individuals the constitution is so marvellously elastic that it can bear an amount of ill-usage that would kill many a race of animals. Whatever may be said of the process of "hardening" by exposure, it surely cannot be a universal advantage to undress under the trees of Hyde Park in an east wind and drizzle, at 7 A.M. in the winter months, plunge into the half-frozen Serpentine, and get home to breakfast cold and blue, with chattering teeth and exclaim with a mixture of Pharisaism and apology in tone, "It is when it is cold as this that it does you all the good in the world." There is much tubbing and bathing in the present day that is excessive, unphysiological, and mischievous, and there are endless follies in the form of clothing that the physician can do little to cope with simply because there are two much more popular preachers than he—viz., fashion and fad.

Excessive heat has some injurious effects in itself, but the really active sources of heat-disease in hot climates are the malaria or other poisons which are there, and the injudicious clothing, eating and drinking which in too many places are habitual. The occupations which expose stokers, furnace-men, and the like to intense heat may be rendered nearly if not quite innocuous by attention to clothing, to the length of exposure, to the full supply of water and of fresh air, and to the alternation of work done with periods of due freedom from exposure; these things to be arranged with knowledge of the wants entailed by special kinds of labour in individual cases. To the philanthropy of employers, and the zeal for all sorts of social improvements in a rapidly growing class of men, as well as to the labours of men of science, are we indebted for the prevention of much of the evil that excessive heat might bring about.

(b.) The absence of deficiency of light, but especially of sunlight, shows its morbid effects in the impaired health of miners, navigators, workmen in cellars, in city offices, and in the night. The night-working to which I refer is such as must limit the income of sunlight to a considerable degree. Those who suffer most are the reporters, litterateurs, printers, writers, and many others whose work is nocturnal exclusively, and who require some distinct changes to be made in their habits.

Anæmia is the prominent mischief brought about by deprivation of light, and anæmia means very much—very much more than mere pallor of the skin. There is no organ in the body which it does not affect; it cannot be uprooted by iron or food, or fresh air, or any other means save that of light; and we do well in prescribing this early in the anæmia of night-working men

The exposure to excess of light may be mischievous to the eye in many ways, but the prevention of such trouble is obvious, viz., the avoidance of such exposure. But the great majority of cases of insolation are to be traced to the co-operation with exposure to light, of excessive heat, bad air in tents, and barracks, unfit clothing, and irregularity of habits together with over-exertion, and early neglect of symptoms.

(c.) Electrical disturbances of health, such as occur in electric and magnetic storms afford much interesting matter for examination, but they are a comparatively rare occurrence, and are often susceptible of explanation by mental and moral rather than physical conditions.

(d.) There is, however, another very common source of discomfort and disease increasing year by year in this restless age: I mean that of physical concussion of the body as a whole, or of its parts. Accidents show us what violent concussion may effect in one moment; but daily life points out a more serious danger than accident can do. A great amount of shaking and knocking about may be borne by some with impunity, but there are hundreds, nay, even thousands, who are now steadily, slowly, but surely damaging themselves by constant travelling, and especially by railway. Such travelling is often accompanied by hard work, much worry, and exposure to the changes of temperature, which make up what we are pleased to consider as, and call our climate. But beside and above all these the near occurrence of shaking, or shock, is observable enough. The most prominent effects are irritability of temper, restless fatigue, want of power of application, defective memory, want of confidence, and want of judgment, with insomnia or uneasy sleep, and depression of spirits. The jar of frequently stopping suburban trains is more commonly and quite as seriously damaging as are the occupations which lead men to travel many hundreds of miles per week. Crying children who will not be rested by a gentle rhythmic movement, may be shaken to something like sleep by a vigorous nurse; and so may the busy man who, paper in hand, jumps into a first-class carriage at the end of a day of work and worry, and is concussed into a sort of coma by six to seven minutes of the train. In the early stages of such troubles, some modification of the daily mode of transit may be of service; but when the discomforts have gone to the point of destroying sleep, appetite, and relish for work, nothing but an absolute cessation of the travelling is of the smallest service.

B. The next group of causes of disease may be put under the one head of modified expenditure as compared with income. There must be in health an outgoing of both material and of energy; and disease is actually present, lurking near, or very easily brought in when arrest of excretion is present.

(1.) The excretion of *material* is as essential as its introduction.

(a.) Arrest of excretion introduces local troubles, which tell back and limit secretion, and this latter limitation becomes at once a general or constitutional disease. Retained cutaneous excreta produce acne and miliaria; arrested secretion may be followed by pleurodynia, sciatica, local paralysis, pleuritis or any other inflammation. So with the urinary organs. Arrest of excretion affects the bladder and the kidneys by a backward action, but the non-action of the kidneys places life in imminent peril from toxæmia of the most urgent sort. So with the bowels—habit, laziness, shyness, or what not, may lead to hernia, or apoplexy, by the straining they induce; but more frequently hæmorrhoids, accumulations of fæcal matter, and their consequences, are the immediate result; but if the intestinal secretion be either arrested or misdirected then grave constitutional disturbance is present or at hand. The same principles hold good with regard to all the systems of the body. The physician has to guide with regard to excretion; but common sense about matters that are mere pathological "pap" to himself, he will find absolutely wanting, and its dictates quite unappreciable by otherwise well-informed and capable men and women, as well as by boys and girls. Want of attention to excretion may be long concealed, but a suppressed secretion at once places the patient in the doctor's hands. General medicine may do much for both, but its true *rôle* is in prevention.

But (b.) evacuations may be excessive, and these of either blood itself, or of other fluids containing it, or its main elements in large proportion. It is enough to mention the drain of hæmorrhoids, or of menorrhagia the exhaustion of chronic diarrhœa, diuresis, or diaphoresis and leucorrhœa to indicate the direction in which preventive medicine may do its best; only again emphasising the common fact that these things have often to be looked for to be discovered, and then some considerable discount allowed as to the accuracy of statements made from either delicacy, the wish to be let alone, ignorance, or the little knowledge carried to the point of danger,—conceit, caprice, or stupidity.

(2.) In controlling the amount, quality, and conditions of expenditure, in mental, moral and physical directions, the physician has a wide range of work. The elimination of force is as important as is that of matter.

There is, on many sides—mental, moral, and physical—a tendency to meet excesses of one kind with excesses of another. There is a "polarity" so to speak, in society, to be seen in the way and degree to which over-work goes along with—I cannot say begets—under-work; mental strain is associated with mental idleness; eager attempts to solve moral and social questions by something more rapid than a motto of mere *solvitur ambulando* impotence, range themselves side by side with the lazy provoking egotism and uselessness of full-blown or unripe swelldom; while at the same time the training of the physical athlete is seen in heightened contrast by glancing at the waxy, cumbrous, dull stupidity of those who take no bodily exercise beyond that of lounging in the carriage or the club, diversified only by the too-frequent cigarette.

(a) Defective mental occupation begets—by way of bad hours, alcoholism, a love for poor literature, and self-indulgent habits—silliness, self-consideration, egoism, hysteria, hypochondriasis, and progressive feebleness of mind, memory, and understanding. Ten talents may earn another ten; or, *per contra*, they may be abused or lost, with character to boot, by simply being laid aside or hid in a napkin; for it is not the man with *one* talent only that may call upon himself the strong disapprobation of his Lord. To use the powers we have, and incite others to do the same, is a part of our work in the prevention of disease.

Again, the moral nature of man and of society may be stunted, misapplied, or blotted out by simple indolence. How often do we not meet with people who care nothing for anything or anybody but themselves; who read both sides of a debate, a philosophical dispute or a police report, with a languid indifference, without ever caring to exercise their own thought as to which is right or wrong, "because it is such a bore to make it out, don't you know," until, by steady practice of not using the brains he has, his one little talent has shrivelled up. And when he may, perchance, try to turn it to some account, he finds that somebody or some conditions have put a brass farthing in its place. This "don't-carism" of young people so common now may be somewhat improved by parents and tutors, but it is the physician who will do more than either if he uses his opportunities aright.

The mere allusion that I have made to the deficiency of physical exertion, is enough to point out the true line that preventive medicine has to take. It is not so much in youth as in middle life that its effects are shown, and our powers are often limited to the diminution of troubles as they occur, rather than to their prevention beforehand.

(b) In this part of the nineteenth century we come into contact with excess of work—mental, moral, and physical—on almost every hand. But let us, so far as consequences to health are concerned, at once distinguish between work with worry and work without, which is almost to say between voluntary and involuntary exertion. Work does not hurt much, worry does. Some are put to learn or do things that they are unfit for, and they suffer. The work may be of the kind that they cannot do, or the amount required may be out of proportion to their strength. Some men can no more learn mathematics than others can music. There is a *pons asinorum* somewhere, not only in Euclid, for almost everyone, and much trouble of school, and college, and after-life might be entirely spared if relatives and tutors would recognise the fact.

Mental work is not excessive if the appetite be good and the sleep sound ; if these be interfered with, the student or the athlete (in muscle) is doing too much. Work for its own sake is beneficial, but under the pressure of an examination looming in the distance, or of some panic in business, work, to get over the difficulty, is often made excessive, and then worry comes on, with its train of physical troubles that attend loss of appetite and loss of rest. The functions of all organs are damaged, and well is it for the man who has the physician for his friend to help him how to arrange his life.

The effects of sudden moral shock are known almost as well as those of physical concussion ; but the long continued wear and tear of a life, distracted by a conflict of emotions, is often unsuspected or unrecognised until it is too late.

Hysteria, melancholia, paralysis agitans, a confusion of ideas and purposes when any attempt is made to use them—what I have called a mental and moral chorea—through incapacity of mind, and loss of all decision and precision of thought are the most common events ; but, with this, there often comes as well, some strange moral perversion, taking the form of extreme melancholia and self-accusation most frequently, but occasionally running into another, still more lamentable state, viz., that of general paralysis of the insane.

The only excess of physical exertion to which I will allude now is that of such kind as shall embarrass the heart and nervous system. There are no physical exertions which, in themselves, are necessarily detrimental to the heart. Rowing, riding, walking, running, climbing, in reasonable moderation or with only occasional excess, are beneficial, and highly so ; but when the amount of necessary exertion is compressed into a deficient amount of time then it becomes mischievous. The heart has its own special relationships to time, and if these are seriously or persistently disturbed, both functions and structure suffer. An exertion which quickens the pulse and respirations may be harmless if within certain bounds ; but if the eyes become prominent, the face flushed, the lips livid, and the extremities cold and dusky the danger point is reached. The line is an easy one to draw but a difficult one to keep. Yet I am sure it is not out of our power to help. Many cases of heart-strain may be greatly relieved by rest, and it is by violent rather than continued over-exertion that the brain becomes gravely affected. But too prolonged or too extreme an amount of physical exercise has its victims, suffering from weakened arms and legs, and other evidences of spinal exhaustion.

The fatigue of excessive muscular exertion upon the nervous system is seen in loss of sleep and appetite on a small scale , but its effect upon armies on the march has been seen in an increased frequency and severity of traumatic tetanus and other affections, partly induced by worry, defective food and clothing; and often by accompanying depression. Epilepsy, chorea, paralysis and the like I have often found to date from physical fatigue, and to have their recurrences almost invariably traceable to the same cause occasionally brought into play.

That which we denote "preventive medicine" when applied to individuals, becomes general "sanitary science" when we have to deal with masses; and it is only by a careful scrutiny of all the causes of disease that we can render that science as efficient as it ought to be. It has sometimes happened that researches in one direction, and for the attainment of one end, have been quite unexpectedly the means of throwing much valuable light upon cognate or outlying matters, such, for example, as the relation, almost accidentally discovered, between the drying of the soil in sundry towns and the diminution of phthisis; but in the main it has been by earnest, planned, and persistent industry that the great achievements of science have been possible.

Life is lengthened, its existence rendered less painful and more hopeful, and its ailments so much reduced by what has been already accomplished, that—given what is wanted in time and in freedom of research—there seem to be scarcely any limits to the good that we may predict for future generations. Diseases, our enemies, one after another, may be diminished, rendered harmless, or stamped out of existence.

The adaptation of man to his environment may be so greatly improved, his frame so fitted to resist not only disease but natural decay, that its pains and weakness may disappear, and be remembered only in the history of evolution, and thus its inevitable end may be without either suffering or fear. The moral nature may be so attuned to its highest faith, and so free from fret, sorrow, or remorse, that death will be welcomed as was birth, for the last "enemy" that shall be destroyed is death ; destroyed, *i.e.*, by being no longer our enemy but our friend.

SOME PAST TEACHERS OF UNIVERSITY COLLEGE:

Being an Address delivered at the Annual Dinner of the Present and Former Students, on October 1st, 1888

GENTLEMEN,

The toast of the evening is—"Prosperity to University College, our Alma Mater."

While wandering abroad, this autumn, I often asked myself, with much anxiety and perplexity, in what way it might be possible for me to say anything to you, this evening, that could be of the smallest interest; and, after much pondering the question, my feeling was something well-nigh like despair. But, one day, while trying to sketch the outline of some magnificent mountains—whose hoary heads were wrapped in clouds and snow—it dawned upon me that I might try to place before you some slender portrait-sketches of a few of the giant teachers of my student days; those great men that some of us, still living, knew so well—in that broad day, to which they added light—but whom many present now, can only see in the warm after-glow of our loving memory. It seemed to me that such sketches might, to-day, give interest and pleasure to those gathered here, and who, like all University College men, love their College-Mother well.

There is no ordinary human being who can accurately recall his first idea of his natural mother; few who can remember being weaned, or cutting the baby teeth. The beginning of a man's life is as deeply hidden from him as is, mercifully, the mystery of its end.

Our "Alma Mater," University College, is to be found, by many of us, among our very earliest notions; but how and when we first clearly knew anything about it we cannot tell; we have "grown up" with our notions, and their development is very hard to trace. But, among my very earliest impressions, is that of a young man, fresh from our College, who came like an electric light, into a small town in Hampshire, and stirred its grave stagnant stupidity into something like the beginning of life, by his lectures on Heat, Light, Electricity, Gases, and other cognate subjects; and who astounded the bucolic mind by explaining thermometers, barometers, and other implements for measuring Nature's work; and, still more than all, by actually burning iron wire in oxygen gas; and by placing me, a very small boy, on a glass-legged stool, to set fire, by an electric spark, delivered through a piece of ice, to a tablespoonful of ether! This demiurge was a demigod to me, if not something greater, and when two gold medals, one given by Elliotson, and the other by A. Todd Thomson, were seen by me, with University College emblazoned on their shining fronts, the great factory that had produced that man, or part of him—for, *Poeta nascitur, non fit*—was like a magic temple to my childish mind; and somehow, then, an insatiable yearning to go there was born within me; and, unlike some insatiable longings, was in due time realised. That man was Francis Taylor, whom some now here may recollect; and whom no one, who had ever known him, and whose genius he had once appreciated, could ever possibly forget. Durance George, too, afterwards one among the brilliant teachers in our College, was of the same town; he gave me my first lesson in swimming, by getting me pick-a-back, taking a header into one of the Romsey rivers, and throwing me off, in mid stream, to paddle, as best I could, to bank!

When my big brother — Henry Robert Reynolds — went to College, and was at the Arts End, he was somewhat perplexed, during one long vacation, to get up Physiology for his B.A. degree; and Francis Buckell, another University College man—the brother, uncle, and sire of many others—but a new comer to Romsey then, said, "I will lend you my notes of Sharpey's lectures; they will help you more than any printed book." Sharpey was examiner in the University, and these notes did their work; and the little difficulty of Physiology, so got over for an Arts man, in his Pass, enabled him to become the University Scholar in Mathematics, and a Fellow of University College.

Just forty-two years ago, this day, University College, as a kind foster-mother, was good enough to take me into her arms; and she has been so kind to me ever since, that I should like, as I have said, to give you just a few of the early impressions, burned deep into my being, by some of the great teachers, from whom it was my privilege to learn, during the five years that followed.

The first figure, one that almost fills the portal, is that of Sharpey—the incomparable, the colossal Sharpey—there he stood to tell us what we scarcely knew, viz., what it was we wished to know; to show us whence we had come, where we were, and whither we should tend; to put the problem of our life-study of Life plainly before us, and show us how to try and grasp it. It seems but yesterday that we heard him struggling to make us understand what life meant, and how its vegetal and animal forms impinged on one another, and defied the cleverest definitions that had been made to sever them. Some of us might have been revelling in biologic dreams of untold "pleasures in the pathless woods" of speculation; but Sharpey was there to tell us that, in the dark night of ignorance, pathless woods had thorns, and traps, and pitfalls; and that our only safety was in following the ways that the great masters had cut out—the ways that led from profitless fancy to useful fact—from the known and proved, to that we sought to know. All the learning of the past seemed to be collected by his marvellous industry, and his astounding memory, in his capacious brain. The sound grain in its vast storehouse was well winnowed from all its chaff, by his unrivalled critical acumen; and dealt out to us in such quantity, at such time, and in such way, as would be best for us. Sharpey was the teacher of all, and the friend of each; and take him for all in all we shall not look upon his like again.

Graham was our next guide, as the day went on, and of him one feels disposed to say, "Thou, whose exterior semblance doth belie thy soul's immensity—thou eye among the blind," would that thou wert here now, to apply some new and true method of qualitatively measuring the effusion and diffusion of the much gaseous matter by which we are surrounded; telling us where known fact ceases, and where pure ancy ventures to rush in, when we so glibly talk of molecules, their gambols and their work; or of polarity, and force, and motion. The range of Graham's thought was as wide as his knowledge of details was precise; his capacity for speculation was equalled only by his relentless energy in verification; while the results of his patience and perseverance in work—those discoveries, great as that of the law of gravitation itself — were communicated to us, with an absolute clearness of phraseology, which none but the clearest of thinkers could adopt, and with a modesty which none but the greatest of philosophers could reach.

Another great doorkeeper of that time was Lindley. He seemed to hold in his hand the keys of the Vegetable Kingdom, and to lead us through all the paths that we had time to take, as if, through all that wondrous maze of strength and beauty, he clasped the silken thread, the useen clue to its most hidden bower, its highest point of view. He actually revelled in the beauty that surrounded him; he often filled the air of the botanical theatre with the choice odours of his fragrant flowers; while through the "Elements of Botany" he enabled us to see the "Natural Order" that had been unperceived by the schoolmen who had gone before him; and following De Candolle—the value of whose work was only just then beginning to be felt—rose to a still higher plane; and by showing the "Alliances" of "Orders," demonstrated the unity of plan in the diversity of form. Lindley came to us "gathering all the fruits" of earth; and he left us "crowned with all her flowers."

Quain was at that time the Professor of Anatomy, and no one who had the advantage of his teaching can ever forget the matchless simplicity of his Saxon language; the absolute clearness of his descriptions and demonstrations, and the artistic manner in which he clothed dead and dry bones with almost living flesh, and artery, and nerve. Quain was the incarnation of an anatomical idea, and he being "dead yet speaketh," and will go on to speak, not only generally to all the world by his great living work on the Arteries, but especially to those of this College, which he has so generously and largely enriched by his magnificent bequests.

Ellis was Demonstrator of Anatomy then, and I can well recall him now, as with long, dark coat, and twisted fez, he perambulated the dissecting-room, looked over our shoulders, kindly smiled at our hopeless confusion in a difficult axilla, took our scalpel and forceps in his hands, cleared away all the rubbish we had been carefully guarding; pushed and pulled nerve and vessel into sight; and left us with the oft-repeated, emphatic, and imperative injunction, "Clean, clean, clean!"

It would be presumptuous in me to attempt to criticise, were I disposed to do so, the great teachers of surgery in that day. Samuel Cooper and Liston come to our minds at once, the one a living, but somewhat antiquated "Dictionary of Surgery;" the other a bright and ever on-going surgeon. The former talked in pleasant humorous reflection on his exploits in the Walcheren Campaign; the latter on what he had seen yesterday, and would do to-morrow. Cooper would say "All distinguished surgeons operated that way, I did so myself." Liston would say—"I don't care a——for what others may have taught or done, I mean to do this or that." Cooper was behind the time, Liston was in it, and before it; Cooper rejoiced in the victories he had won, and witnessed in the past; Liston acted in the present, and looked forward joyously to the future of his Art, the great triumphs of which he did not, however, live to see.

It may be interesting to many here to recall, and to some others to learn, that the first operation in this country, performed under an anæsthetic (ether), was witnessed in University College Hospital, and was done by our great surgeon, Liston. Peter Squire, the father of scientific pharmacology in England, and a friend of Liston, having become acquainted with the use of ether as an anæsthetic in America, administered it, experimentally, to his nephew, William Squire, who was then a pupil of our College, and rendered him quite insensible. He was the first to undergo this process in England. William Squire and I were fellow-students, and he administered it to me shortly afterwards, as I wished much to know in what order the senses became extinguished. Those mixed senses, smell and taste went first, then sight, then touch, and the capacity for appreciating pain, and then—*longo intervallo*—hearing. They, the senses, came back in inverted order hearing being an easy winner in the race.

The day after this observation was made there was a field day in the hospital, and Liston had consented, at Peter Squire's request, to try the anæsthetic. I can see him now, as he said to the students, with playful eye and doubtful, almost scornful, mouth, "Gentlemen, we are going to try a Yankee dodge for making men insensible. This man's leg has to come off above the knee, and my friend Mr. Squire is going to give him ether, so that he won't feel it." When Squire was giving the anaesthetic, Liston leaned against a bench, trying the point and edge of his long amputating knife and smiling incredulously, as the poor owner of the doomed leg hissed and snorted under the process of inhalation. Ether was not so pure, and apparatus for its administration not as handy, in 1848 as they are in 1888, and so, perhaps, Liston was a little impatient to get to his work; but at length Peter Squire said, "He is quite ready now, sir." Liston's knife flashed in the air, I took out my watch to count the time, and the leg was on the floor in six-and-twenty seconds. As if it were yesterday, I remember the expression of Liston's face as he turned round to us students and said, —"This Yankee dodge, gentlemen, beats 'Mesmerism' hollow!"

Soon after this our ranks were sorely broken. Liston, who had saved others but could not save himself, was taken from us by a malady which the surgical art of that day could not, and of our day cannot, reach, but which the surgery of the future may yet conquer.

Syme came and left; to be followed by a teacher whom all who knew venerated beyond all words, and from whom many learned, as they have gratefully acknowledged, their greatest lessons in the art which has made their lives conspicuous by success.

James Moncrieff Arnott was a man whom it was a privilege to know, and from whom morally, scientifically, and practically it was an unspeakable advantage to have learned.

In the study of Physic, then, the two great leaders were Williams and Walshe, the one Professor of Systematic, the other of Clinical Medicine. If the one dealt with the Principles and Practice of Physic, the other trained us in the Practice and its Principles. If there were specialities in those days, they had the same speciality; if there was general knowledge at that time, they had equal shares. If consummate ability in teaching was what our College prepared for us, it is impossible for me to say which should bear the palm. To know the truth, and to tell the truth, was the aim of each; but the ways in which they worked, towards their one aim, were as distinct as the men themselves. The one, of necessity, as Systematic teacher, started from the centre to the periphery, the other, as Clinical professor, took an opposite course; the one led us from principles to practice, the other from observed facts to principles. This was in full accordance with the plan of the learned Council of our College, which had decreed with great wisdom, that Medicine and Surgery should be taught by two professors, in these two different modes.

The function of the one was to arrange and explain the general laws according to which diseases did their work, and to group all the wide range of morbid processes into some natural order; that of the other, was to start from some actual facts in hospital, and, in explaining them, to grasp some general principles behind them and above, and find in their concentration the principles from which the other had made his launch. And so it came to be that we, fortunate alumni from 1846 to 1850, had the great advantage of learning from two men, whose different lines of thought fitted each, in his own place, to present to us the most consummate excellence of their most characteristic thoughts.

If the great genius of Williams led us, in the morning, into some untrodden regions of speculation ; if in clever generalisations, he sometimes passed beyond us, out of sight, if, now and then, his previously, perhaps inductively, conceived ideas had bewildered us, in our attempts to follow their deductive application ; we might, on the same afternoon, as the chapter of accidents might ordain it, have all that he had suggested cleared or brushed away by the stern logic of Walshe, as he expounded the meaning of the case we had just watched with him in the ward ; the diagnosis of which he had conducted *per viam exclusionis ;* the symptoms of which he had valued by the numerical method ; and the *post-mortem* examination of which had just proved that he was either right or wrong, he cared comparatively little which, so long as the real truth was known. The genius of Williams often led him to go far beyond, and above the notions of his day, and to rise, perhaps, as sometimes he did, superior to facts ; yet he never led *us* astray, but only suggested lines for thought that we could not have discovered for ourselves. The genuis of Walshe, on the other hand, was constantly laying before us the results of the vast regions of facts, which no one like himself had known, no one like himself had mastered, and no one like himself could marshal before the minds of those who were there to learn. Each was a giant in his way ; each was a teacher, from whom any one might have been, and still may be, proud to learn ; but to have learned from both was the privilege, and unspeakable advantage that was accorded to those—and they were many—who were students of University College at the time of which I have been speaking.

One thing that I have mentioned—viz., the introduction of anæsthetics into operative surgery in England—occurred at that time. Let me recall another great change in treatment. When I was a clinical clerk in University College Hospital, every one was bled, whether he had pneumonia, apoplexy, a compound fracture, or a fit. When I was physician's assistant bleeding had gone out of fashion ; and if the expectant method was the treatment of one physician, brandy formed a large element in the treatment of another, while four ounces of blood were habitually abstracted for analysis by a third. Again, let me remind you that in those days there was no laryngoscope, ophthalmoscope, endoscope, otoscope, nor any other modern 'scope—the microscope was there, and about it one of the eminent professors of that time once said to me, "If anything is so small that it requires a microscope to see it, I am quite sure it can't be of any great importance."

There was no sphygmograph, no electric light, no electrical apparatus that could be of any use in diagnosis, or in treatment. An old "Smee," always broken down, was our only luxury. The thermometer for clinical purposes was unused, and bromine as a therapeutical agent was unknown.

Imagine, gentlemen, our deplorable condition! Where would you be now under such desperate needs? I will tell you where—just as we were then—making the best of the machinery with which we had to work, and pressing onwards, as we are all now, to the future of our science and our art. Every addition to our means of acquiring precise knowledge of facts is of enormous value; and this, although the direct application of that knowledge in the treatment of disease may be, at the time, unseen. We know much more now than we could know then, and medicine is gradually becoming scientific; but every new addition to our means for acquiring knowledge is the outcome of the work which went before it; and we are now reaping the harvests from seeds that we ourselves have not sown, but which were thrown broadcast, or with minute precision, by those who were our forerunners in the field.

From that day to this University College has maintained its place; but it is not for me, now, to bring before you the great galaxy of science and of power that—powdered with stars—has over-arched the gulf of forty years. Among the men who have followed those that I have named, are many stars as brilliant as any of those that I have pointed out; and I doubt not that, among the teachers yet to come, there are many, as yet, unresolved nebulæ, which will render our College still brighter in the future than it ever has been in the past. To teach is to learn; and I am sure that many of my old pupils, now on the staff of the hospital, and in the professorial ranks, will agree with me when I say that although our professors taught us much—for which we are profoundly grateful—we never learned so much from them as we did from the pupils we essayed to teach!

One word more; if University College, London, has so stimulated the older universities as to make them open their doors, and grant their honours to all comers, and has, in so doing, somewhat sapped the strength of its own *raison d'être*, the Medical School has lost nothing by the increased liberalism of our sister colleges and universities; but I must ask you to remember that our Alma Mater was once called the "University of London," as the buckets in its corridors still show; and further, that many of us entertain the not unfounded hope that University College with its sister, King's, may hereafter become the nucleus of a vast institution, the like of which has not yet been seen in this metropolis, and which may be, not long hence, known as the "Albert University of London." If there be one fact that can more than another lead to the establishment of that University, and one element more than another that can conduce to its prosperity, it is that our President, John Eric Erichsen—a pupil, a teacher, a professor, one of our hospital surgeons, a Member of the Council, and now its much honoured Head—has this great project at his heart; is intimately acquainted with all that can lead to its realisation; and is endowed with the indomitable energy which always, in such combination, ensures success.

Gentlemen, I give you "Prosperity to University College, and long life and happiness to its President."

ADDRESS

Delivered at the Distribution of Prizes, in the Medical Faculty, University College, London, October 1, 1890

GENTLEMEN,

Some years ago, it matters not to you how many, it was my lot to sit in this familiar Theatre of University College where you, gentlemen, are sitting now, and during several sessions to receive from the hands of its President, Lord Brougham, or from those of some other distinguished man, the like kind of reward you have received to-day. During many years after that, I had the great and responsible pleasure, as Professor of Medicine in this College, to make the award of honours in my class to those who had competed for them. And now the President and Council of this College have conferred on me the distinguished privilege and great honour of distributing the prizes you have gained. As former recipient and judge, and now as distributor of rewards, I most heartily congratulate all of you who have to-day been successful, not only on obtaining gold and other medals, with certificates of honour, but on having tried to obtain them, and in having so schooled yourselves to deserve, and attain success.

If, gentlemen, you have been able, quite carefully and honestly, to congratulate yourselves, knowing well that you have deserved the place that has been accorded you, my congratulations are superfluous ; because in the court of your own hearts and consciences—a court from which there is no higher appeal on earth—you have pronounced approval, and therein have met with your highest award. If, as it has been said by a well-known author with regard to scandal, when people say unkind and depreciating things about you, there is no satisfaction like that of knowing you have deserved them; *a fortiori* is it true, on the other side, that when you have obtained a distinguished honour, and good things are said about you, there is no gratification like that of knowing they were your due.

Let me inform those who may not already be acquainted with the fact, that the examinations, the results of which it has been my happiness to distribute, have been not for a pass but for honours. It is not a mere "competence" that has been declared, but relative individual value; the value, that is, of the student's capacity for the acquisition and storage of knowledge, and also of his power for reproducing it. In this way the competitors have come to know that A is, *quantum valeat*, better than B, B better than C, and so on to the end of the alphabet. The real value of this discovery to each and all is this—that they may now examine themselves, and find out why it was so; and the less successful may learn how to amend their ways of study, while the most successful will know the secret of their success, and become able still further to improve their method.

Together with the pleasure of obtaining a knowledge of relative position there is, almost always, the added pleasure of surprise. That is, of course, the most strongly marked in the first year's men, who have not beforehand measured their relative strength; but it is not altogether absent in the struggles between senior students, *i.e.*, unless—in this age of *nil admirari*—they, before entering upon college life, and before arriving even at their teens, have found nothing to wonder at in anything, not even in the mysteries of the Egyptian Hall, nor in the most astounding harlequinade of a gorgeous pantomime in Drury Lane! Thank heaven, such prodigies do not often enter the medical profession, or if they do they very soon retire from its ranks. One of the most gifted of our former professors, Dr. Walshe, whose name can never be mentioned in this College or elsewhere without supreme respect, said to me, many years ago—great master as he was in diagnosis—he never had made a "*post-mortem* examination without finding out something he had not expected, and failing to find something he had"; and so I believe even the senior student is not, even now, nor will be hereafter, altogether robbed of this element of surprise in his competition with his peers.

This latter half of the nineteenth century, the one in which we are living, may be described as "the examination stage" of our social development; and it seems to me quite possible that it may develop into an "examination-craze." Not that examination is a thing of this half-century, for it has been going on since time began, and will continue until time shall end; but it has become nowadays the almost universal mode by which we select men for almost every post that men may covet; and it has become the fact that "written papers," *viva voce* questioning, and testing by practical use of implements, are the methods by which men must be allowed to either rise or fall. Statesmen are "questioned" in both Houses of Parliament, and would-be statesmen on the hustings, and little boys and girls are questioned in village schools, and each and all are put into their places by "examination."

This College was founded, as you all know, as "the University of London," and its functions were both to examine and teach; and when the University of London, as now known, took that title, this College undertook still to teach, but to examine only its own alumni. At the same time the University gave up all teaching, and made itself into only an "Examining Body." We in these walls cannot make complaint; for I think it is from us the examination epoch arose; certain it is that the examination "fever" was fanned to its present height by the University of London, which University is our legitimate descendant. It is not my purpose to say or to hint at what may be the result of the investigation now going on by Royal Commission; but of this I am very sure, that upon examination, a simple "examination system" has been found defective: and that University direction of teaching is quite coming to the front. The examination process of the University has shown that teaching has been defective; at least so I read the facts, or else why should there be at the present day, in addition to our colleges and schools, a large army of grinders, coaches, and the like—to pull, to push, or by some other curious *vis a tergo*, to shove all sorts of students, all sorts of candidates, for all sorts of places, through their examinations?

So long as the grinder survives—and I much question whether he be "the survival of the fittest"—one or two, or all, of three things must be true; either the teaching of the schools is defective; or the students are wanting in some capacity, or some industry, or both; or the examination-process is at fault. It is, of course, I need not say, quite impossible to entertain any of these suppositions with regard to University College; our teachers, and our taught, and our examinations are, as they should be, above suspicion; but when we regard the facts generally, and from an entirely objective point of view, I think we may fairly say—as puzzled physicians and surgeons have often said before in puzzling cases—"there is something wrong somewhere!" The grinder, the middleman, may be a necessity of the day; but if teachers, and examiners, and students did all they could do, I, for one, think his services might be dispensed with.

With regard to the possible faults in examination, this must, I fear, be admitted, that although the scheme of examination may be well-nigh perfect, in testing both the quality and quantity of knowledge—*e.g.*, when it embraces written papers, oral questioning, practical testing with clinical implements, in conversation, and by the bed-side—yet notwithstanding this well-arranged plan, what some individual examiners seem to be most successful in discovering, is, not what and how much the candidate does know or can do, but how much he does not know and how little he can do. This is obviously a grievous failure, for all the combined knowledge of all the examiners and examinees in the University cannot amount to more than a fraction of the truth we want to know, the value of which fraction it may be impossible to represent, except relatively, and that by arbitrary standards, and arbitrary "marks" what then must be the difficulty—how immense, how inconceivable—when the process and objects of Examination are inverted, and the sum of combined Ignorance has to be investigated, and some test applied to the discovery of its relative amount?

The principal fault of the unsuccessful candidate has, I take it, generally been this, that he has not, beforehand, systematically gone through oral and other class examinations; and has failed habitually to examine himself by such methods as he might and ought to have devised. Let me say, without any fear of serious contradiction, that if a student would make a habit of taking some of the University or College "Examination Papers," and instead of just thinking "Oh, I could easily answer them," would sit down quietly in his own study, and, without note or book, write out all he knows as their answers, he would find his definite information thereon to go into a very much smaller space on paper, and occupy a much shorter amount of time in writing than he had previously supposed.

Ladies and gentlemen, as the result of many years of experience in this College, I may tell you, perhaps to your surprise, there is but a very small minority of the aspirants either for Degrees or for Class Honours who make use of the opportunities afforded them for this kind of education. I will go back no further than to my own student days, when the classes of Sharpey, Graham, and Quain were at their largest; and when I tell you that out of one hundred to a hundred and fifty men, who might have competed for honours, there were really not many more than twenty-five, and often not so many who ever did so, it will be your lament as well as mine, that "some mute, inglorious," I will not say "Miltons," but physiologists, anatomists, and chemists have been lost to fame, and that we can but utter our "Elegy" over their unknown graves; some may be in "Country Churchyards," and some, I hope many, may have received higher rewards, and found their niches in higher resting-places; but to us, unfortunately, they are the "Great Unknown."

As to the possible faults of teachers, it is not for me, as one of them for many years in the past, to speak on this occasion; but I am quite sure that, in this College, every endeavour has been, and still is, made to meet the requirements of the students, and to assist them at every turn of their career, not only by lectures, but by personal aid, in the direction and testing of their work.

But, now, gentlemen to move onwards, let me tell you—after you have passed all the examinations that are required, whether they be those of the Conjoint Board, the Royal Colleges, or the Universities, your real examination begins, and you have to pass through that all the days of your active professional life. It is the examination by your patients, and, harder still, by your patients' relatives and friends. In this severe ordeal, all your knowledge, your tact, your sympathetic power to suggest what your patient wants to tell, but does not know how to say, will be keenly tested; and your suggestions for relief will be measured, not only by your administration of drugs, or the use you may make of the appliances of your art, but by the way in which you do these things. You will gain your patient's confidence, I believe, by showing that you are more than a physician or a surgeon, and that will be by making him feel you are a man. This is not to be done by yielding to his fancies, nor by the assumption of either superhuman knowledge or any quite exceptional ability; but by simply showing that you know what he wants, that you can understand his sorrows, and will bring for their relief all that the knowledge of the time has placed within your reach. No one can help you much to do these things; you must learn the art yourselves; and I am sure that the most direct road to such learning is first, to forget yourself; try and throw yourself into your patient's condition—for you can, if you will—try to understand him and his surroundings, and ask yourself, what would be the thing said to you that would be the most helpful to you if you were in his place? and then, with the strength of your knowledge, gained by reading and experience, tell him that, and bid him God speed. Your success will depend upon your getting rid of the notion that your patient is merely a more or less interesting clinical study in pathology or diagnosis; and upon the degree to which you feel yourself, and make him feel as well, that it is the man, and not his malady, that you are treating. How are you to learn this, you may ask; and my reply is, no professor, no examiner, no middleman, nor grinder, can teach you; this great art can only be learned by "sincere desire," which is the soul's "prayer" to Him who made it; and by the cultivation of all those faculties of intellect and heart with which he has endowed you. Concentre your attention upon the case before you; forget all theories, all fancies, and all crotchets; try to understand the man and to feel with him; and you will pass that examination with far higher distinction than any you can receive in this College Hall. Utterly forget, in the process, the golden honorarium you may have duly earned, and may duly receive, for you will have obtained the gold medal of a higher reward—the approval of your own heart and conscience in having done real service to a suffering fellow-man.

There is yet another examination—to which, I hope, many here to-day are aspiring—and that is to become professors in this College, and physicians or surgeons to its Hospital. Believe me when I say—and I am sure all my past colleagues will agree with me in saying it—there is no examination so stiff as that you will have, then, to undergo. The Faculty of Medicine will examine your claims for appointment with no partial, but with most clearly discriminating eyes; the Council of the College will examine the report of the Faculty and of the Senate, and if you are successful in your passage through those ordeals, your most real examination will, even then, be but begun. You have, then, the "last and sharpest height" to reach—the examination by your pupils. That "board of examiners" is the most exacting, the least reticent, and—I say it with all respect—the most unsparing of them all; and for this reason, that they know quite well, as a rule, from whom they can learn, and from whom they cannot; and they have no hesitation in expressing their decision by avoiding lectures or clinical teachings, no matter how earnestly the professor may have prepared his teaching, or arranged his clinique. You, senior students of this College, now—you who may have these aspirations—to you let me say, now is the time for your study of the art of teaching; ascertain what it is that enables you to learn from this teacher or from that; and see to it, that, when you take his place, you have profited by his example. Do not try to imitate any one; mimicry may be a compliment to the master, but it is a weakness in the copyist; but find out what it is that makes a great teacher, and grow up to that, by earnest study, not only of the teacher, but of the taught.

You have joined a noble profession, one which is second to none in its usefulness to the individual and to the world at large. There is no hope for the world without life and health, and our profession is the custodian of each. I will not say anything now as to its rewards and honours—as commonly considered—although much might be said; but, if your aim be single, viz., that generous care for, and love of humanity, which is our highest stimulus, you will obtain your reward. It may not be what you now aim at, or may expect, but it will be real, and, in the best use of the word, substantial. To speak of no other and highly distinguished honours, let me call your attention to this most gratifying fact, that a former student in this College, one of its professors, one of its most active of surgeons and accomplished men—Professor Erichsen—is now our president. The highest honour which any college can grant has been accorded to him; and long may he live to conduct and preside over its deliberations, with the untiring zeal, complete efficiency, marvellous sagacity, and untarnished honour he has hitherto displayed.

Gentlemen of the medical faculty, remember that this College is very much more than "a medical school." It embraces teaching in its very widest range; it teaches physic, physics, and metaphysics; Pali, Telugu, and political economy; to say nothing of philosophy of the mind, bandaging, Sanskrit, and diseases of the skin. There is scarcely a single range of teaching for which it has not the fully equipped apparatus in its hand, and it is over this great College, as a whole, that one of its former pupils and professors now so ably presides, and does so much with the heartiest thanks of all who know him, and who know also what our College wants.

With but a few words more I have done. The tragic event of the last few days, the absence from this gathering of one of our distinguished alumni—a young, but most efficient officer, who has attained the final honour of being "killed in action" in a fierce, heroic, hand-to-hand fight against a deadly foe—gives depth to the solemn thought which must be in all our minds, as we remember there is one last examination through which we all must pass—our final test—when we have laid down our work, or it has been taken from us, early or later, by a Higher Hand; for this it is our life-duty to prepare, with earnest, brave foreseeing; and to this we shall, when the one "clear call" for us may come, be ready to cry "Adsum," if we serve faithfully our day and generation here, and go forth, without fear or trembling, to see our "Pilot face to face, when we have crossed the bar."

THE ORGANISED PROGRESS OF MEDICINE:

Being the Presidential Address delivered at the Sixty-third Annual Meeting of the British Medical Association, at London, on July 30th, 1895

GENTLEMEN,

Twenty-two years ago the British Medical Association held its annual meeting in London, and last year the members of the Metropolitan Counties Branch thought there were then abundant reasons why the Association should be invited to assemble here again, and the whole meeting of the Society convened in Bristol cordially accepted the invitation.

The Association was presided over in 1873 by the late Sir William Fergusson, the most distinguished surgeon of that day; there must be hundreds here who remember him well: his grand physique, his skilful and, indeed, artistic performances; the absolute ease with which he bore himself under the most trying circumstances of unavoidable accidents and yet not unforeseen, of events which no human knowledge could forecast, and of difficulties which needed all his resources of hand and courage to encounter. Yet, gentlemen, I venture to say that if, like a well-known but not quite historic character, Sir William Fergusson could have fallen asleep about that time, and have not waked up again until now, and were capable of appearing amongst us again, absolutely unconscious of the kind of progress made in surgery during those two-and-twenty years, and of the steps by which such progress was carried to its successful ends, even that dauntless surgeon might pause to perform an operation which either of his dressers of twenty years ago might be announced to do to-day, and would do without fear or dread. "Experience is by industry achieved and perfected by the swift course of time." Such industry has been unsparing, I may also say relentless, not in consideration of the patient, but of the worker. It has come from all sources of scientific investigation that could be focused in the operating theatre, and it has done more than the surgeon of my student days—and Robert Liston was daring enough—could have foreseen even in his most optimistic dreams.

The Address in Medicine was delivered in 1873 by the late Edmund Alexander Parkes, and all of us who remember him, and all who have become acquainted with his writings, know how vast was his range of information, how keen his foresight, and how subtle and yet how true his faculty as a critic; but still, if Parkes could, even after only the few years since his untimely death, revisit Netley, or his still older haunt, University College, even he would be entirely bewildered and amazed if he found his house physician feeding a patient on sweetbreads, or injecting thyroid extract for the cure of myxœdema. In physiology, in pathology, and in medicine advances, equally important to each, have been made during the past two-and-twenty years. It is not my intention to occupy your time with any details on these matters; but let me recall for a moment your attention to the vast strides that have been made in the elucidation of both structure and function—such, for example, as in the researches upon the thyroid, the adrenal bodies, the spleen, and the liver; the advance of bacteriology; the function of the axis-cylinder of nerves; and the magnificent prospect before us of a new field of therapeutics in the serum treatment of disease. Physiologists, pathologists, and therapeutists have "seen visions" and in the past have "dreamed dreams"—as we may be dreaming now—but the facts, now well before us, have certainly astonished even the expectant, have surpassed their imaginations, and opened before them, not one only, but many doors into regions crowded to the full with yet more fruitful information, waiting only to be arranged and utilised.

So much of the work that has led to this present state of science has been accomplished in the metropolis that, although we know what has been done and is still being done in the provinces, we thought it well to ask you to meet us here, tell us of your own work, and join with us in a mutual endeavour to gather more and more by combined work and earnest, honest rivalry for truth than we could do by disunited efforts. What my object in this address is mainly concerned with is to draw your attention to that which seems to me to be the most striking fact of modern physiological, pathological, and therapeutical research—namely, the power of living things for both good and evil—namely, in the conservation of health and in the prevention or cure of disease. The mineral and inorganic world has helped us much, but now our help and hope come mainly from organised products and still living agencies.

During the last twenty years there has been established, to the great advantage of our profession, the Conjoint Examination by the Royal Colleges of Physicians and Surgeons. This, while not interfering with the autonomy of either College, has raised the plane of education required of all who are candidates for entrance into the profession, and has so brought into combined action the Colleges themselves, that they have added, each to the other, authority and dignity in the recommendations they have made from time to time with regard to matters of education, Parliamentary proceedings, State medicine, and scientific research. But the building on the Thames Embankment, which will be well seen during the next few days, is very much more than an Examination Hall: it is the centre of a very hive of industrious work. You will see there the most recondite and obscure processes of Nature under the most elaborate scrutiny and faithful record. The delicate phenomena and suggestions of living and chemic functions are under minute survey, analysis, and detail. The points where they touch, the mode in which facts of either may be rendered in terms of the other; their bearings upon the life of animals and men, both as individuals and as parts of a community; the diagnosis of the most obscure diseases, and the tentative and more than tentative endeavours to counteract poisons, which can be separated but not destroyed, over-ruled but not abolished—these, and much more, you will see under the skilful and careful guidance of the able director of the laboratory, who, with his many coadjutors, will gladly welcome all those who are interested in such minute research. This is one of the products of the last twenty years, but it does not stand alone; the Brown Institute, the Society for the Promotion of Knowledge by Research, the laboratory of University College and of the other large schools, are all doing similar work, and constitute the most promising features of the present day with regard to the advance in the science and art of medicine. In all our schools you will, I am sure, find very great improvement in the mode and scope of teaching; and this especially in it being less didactic and more practical. Much of the old-fashioned, often dreary lecture of an hour's duration has passed away, and in its place is a "demonstration," an "object lesson," a conversation, or examination. These are more useful and therefore more attractive to the students, and at the same time more trying, but none the less efficiently rendered by the teachers. Again, in clinical teaching you will observe much more and closer personal relationships, not only between the physician and student, but between the student and the patient. The latter is not a mere dummy in a bed, exhibited as a specimen of this disease or that, but a human being to be spoken to and to help you—I mean the student—to find out whether or no the card at the head of his bed, on which the diagnosis of his malady is supposed to be written is correct or as full as it might be.

Then there is another point which has struck me much during the past ten years, and especially so whenever demonstrations are being given, either at the bedside or in the laboratory, namely, the far greater interest and earnestness which characterise the student of to-day as compared with his predecessor. Much of this is, I think, due to the indulgence of a larger hope. Hidden as still are the great mysteries of life, there yet are definite facts to be grasped by the mind, to be seen and handled, not only imagined or asserted ; and the place of these facts in the economy of Nature, their bearing upon others, and their relation to work yet to follow, give a precision and confidence to study that is, comparatively speaking, of modern growth. There were plenty of assertion and show of knowledge in the past ; but even the teachers did not believe the half of what they taught, or comprehend the half of their sage pronouncings. Nature has, as it were, taken man more into her confidence, and daily reveals so much, even while concealing more, that the learner stands firmly on the ground he has gained, instead of trembling on a quagmire, the length and breadth and depth of which he could not see and did not care much to imagine or investigate. He felt sure of little then but of his own and his teacher's ignorance, but now he grasps much that is ascertained truth and such as can be seen, shown, measured, and recorded with perfect accuracy. Our metropolitan museums in Bloomsbury, South Kensington, and Lincoln's-inn-fields will afford to all museum lovers an ample reward for careful examination. Two of them were splendid examples twenty years ago of what could be done to make collections of material instinct with information and object-lessons of physiological and anatomical lore ; but the marvellous accumulations that have reached us during the period I have mentioned are, I think, only exceeded in marvel by the industry, high thought, and consummate skill with which these materials have been arranged, and made to tell, in their own way, the story of their being and of their place in the great Cosmos of which they form a part. The journal of the Association informs us that the work of this meeting will be carried on by fifteen sections, fully equipped with their respective officers, and each presenting subjects for discussion to be brought forward and threshed out by able hands. But let me remind you that these sections, or at least many of them, have had now, for varying numbers of years, their counterparts in the metropolitan and provincial branches and societies, where discussions are taking place all the year round, records of which are constantly published in magazines, proceedings, and other appropriate journals. In this manner the increase of medical literature has become enormous, and as a rule its value is very high. Of course, it would be too much to suppose that, coming from so many sources and from such differently constituted minds, its merits should always be equal or of the highest order. It cannot be expected of all who write and all who speak that one should say, as was well said of one of our late distinguished members, "he spoke because he had something to say, not because he wanted to say something." In the business of these societies it is the bringing together of recent facts or ideas and the friction of mind with mind that is so useful in separating the real and substantial from the imaginary or accidental; and in this work all our large towns and even country districts are assisting; and the marvel is that when we meet, even as we do now here in the metropolis, there should be such a tremendous store of material to be brought before us for discussion or reception. For example, in the Section of Medicine alone there are three subjects for discussion, and on these fifty members have already expressed their wish to speak; there are, moreover, thirty papers promised, and it is to be expected that few of these will pass without any variety of opinion on their merits being entertained and expressed. It is not to be imagined that all that is advanced will be either new or true, but of this we may be sure—that nothing will be brought forward without duly careful consideration, and apart from the belief that it is worthy of the time and the attention which those who are present will be asked to bestow. I am induced to make these remarks by the fact that the number of members of the Association is now three times as great as it was when we last met in London, and it is one of the most important events of the last twenty years that such an organisation should have grown into being, and should have such a vast influence for good over the whole civilised world.

There are some points in our present state of scientific precision in which, to my mind, it would appear we have made but little advance. We know much more about diseases, their origin, their anatomy, pathology, inter-relations, modes of ending, and their treatment ; but with regard to nosology and nomenclature there is little of which we have to be proud. Groups of symptoms have been described by different observers as marking some tolerably distinct departures from recognised types of malady, and, for want of any nosological position being assigned to them, they are called after their first describers' names, and so we have not only Bright's disease, Addison's disease, and Graves' disease, but a host of others, often indeterminate in character, going by the name of Fredreich, Raynaud, Hodgkin, and others, until there is a fair prospect of every distinguished pathologist or clinical investigator being handed down to posterity as a disease the name of which conveys no semblance of a meaning as to its nature. Still further, and more to be deplored, there are smaller groups of symptoms which are not honoured by receiving the names of their describers as separate diseases, but the names of the observers are tied on to the symptoms ; and so Cheyne-Stokes' breathing, Corrigen's pulse, von Graefe's sign, somebody else's phenomenon, and a multitude of other like phrases are used, to the great confusion of the student, and not only so, but to his real and permanent injury. For what is easier to say than that there is "Cheyne-Stokes' breathing" except to feel a sense of rest in having made use of that learned phrase, and so practically to shut the door to further inquiry as to what it means and how it comes about, what its diagnostic or prognostic value may be, and how it bears on therapeutics? When quite a boy I was watching the dying bed of my maternal grandfather, aged eighty-four, who had been afflicted with right hemiplegia and aphasia a few days previously. Of all medical terms I was absolutely ignorant, but that variety of breathing struck me much—as it was likely to do—and after observing several long pauses I exclaimed to the nurse, when he had not breathed for over a hundred seconds, "Surely he is gone now!" To my surprise the practised old observer replied, as she looked up from her knitting, "Oh, lor', no, sir; they never goes that way!" So far as my own experience teaches me she was right; but I have not yet met with a satisfactory and thoroughly scientific explanation of Cheyne-Stokes' breathing nor of its prognostic value. Of course, to give the proper name to a disease is to place it where it should be nosologically "at home" and understood; but medicine is not a science yet sufficiently "ordinated" for this thing to be done, and so we grope about and "gather dust and chaff" with little chance or hope of turning them to value; and instead of making this the matter of most serious investigation and finding the true relation between the new group of symptoms and those others which form the central facts—the backbone and whole skeleton of pathology, we lay hold of the first piece of red tape ready to our hand, tie up the group of symptoms in a bundle, and label it Brown, Jones, or Robinson's disease.

A suggestion was made not long ago by one of our most able and energetic thinkers that some apparently new diseases might perhaps with advantage be named provisionally after the patients who exhibited them. This certainly had the merit of originality, as it struck me at the time I heard it; but in looking at my case-books I found that already I had several times adopted it, in so far as to say "Case X Y Z resembling in particular features that of A B C," or some other very familiar patient. But nothing could be worse for scientific medicine than any such retrograde proceeding. If there be any danger of nomenclature resolving itself into a catalogue of the names of distinguished pathologists, as has been suggested, it would be a still more terrible disaster if a differentation should be carried still further on this dual system of nomenclature, and that the student should have to be examined in his knowledge of the "George Brown variety of Robinson's disease" or the "Max Schott's deviation from von Hopner's sign." At the very time that there is this increasing use of loose phraseology there is also—as is common enough in other departments of life—a marked tendency in the opposite direction, and that is to connote as diseases certain groups of symptoms by some short or long and often not very appropriate word or words, such as acromegaly, hypertrophic pulmonary osteoarthropathy, appendicitis, pseudo-hypertrophic muscular paralysis, and others. There is abundant precedent for this; some are time-honoured and old enough to be allowed to live, such as pertussis, epilepsy, apoplexy, chorea, gout, and rheumatism, which have the merits of brevity and of meaning; but there have crept into ordinary conversation nowadays a number of expressions which aid us little or, as I think, not at all; and such words as gastrojejunostomy and laparotomy do little more than lay us open to such satire as that of the playwrights of the last century in foreign countries and its predecessors in our own.

But whatever may be our failures—and they are small compared with our enormous successes—there is nothing that has happened during the past twenty years to be compared in importance, as I have already said, with the new revelations that have been made of the potency and pre-potency of life—the power of life in life—in health, in disease, and in its treatment. I allude, of course, to the interpretation of much of the functions of certain organs, the existence of which had been known for many years, but the utility of which had been absolutely unknown—for example, the pituitary body, the thyroid gland, the suprarenal capsules, and others. The knowledge of the functions of the liver and the spleen has been gradually increasing for a long time, and only by slow degrees have the metabolic properties of these organs taken the place of the older ideas of secretion of bile and balance of weight. It has been, on the other hand, partly the outcome of serious investigation, but partly the result of a fortuitous concourse of thoughts and events, that the most astounding revelations of modern physiology have been made. What we have come to know amounts to this in general terms—that the absence of certain organs, of the functions of which until quite recently we knew nothing definite, leads to grave and diverse diseases of the body, whether this absence be brought about by surgical operation or by disease more or less individual or specific in its character; and that, such being the case, the supply of the material of that organ as food, or some part of it, as an extract, to be introduced into the blood, removes the symptoms, acts with great promptitude, and, I might say, almost with some violence of disturbance of the whole economy. Not only so, but these extracts seem to possess a power reaching far beyond that which was first found to be their almost anticipated result. I mean by so modifying the action of the heart and the intravascular pressure (in a manner and to a degree entirely unlooked for and requiring much further investigation, in order to unravel the true nature of the functions of those organs in health, and the value they may have, by their products, on the processes and treatment of disease.) As yet we are only on the threshold of still greater discoveries in regard to life, but we see, through the portal, ranges of facts which are trustworthy guides as well as sign-posts, and which will, we believe, lead us to a larger knowledge of those recondite processes of life in its most essential and characteristic features—namely, of the nutrition of all organs, of the way in which this is brought about, and of the interdependence of all tissues. So that, perhaps, in a far higher sense than we have ever realised before, the truth may be revealed that "when one member suffers all the others suffer with it," and the reason of this may be explained. A very obvious consideration which should give us pause in self-congratulation is this, that as in past days the functions of different parts of organs—the kidneys, for example—were more or less clearly separated by physiologists, no longer with us now, so we have seen recently that only certain portions of other organs have the physiological effects just discovered, and thus that there may be in what we have regarded as much simpler organic components, even in quite simple tissues, some unconsidered element of function, some *sine qua non* of healthy life, some missing link in the phenomena of life, so that it behoves us to keep the mental eyes wide open to clear away all films of prejudice or hasty complacency, to expect the unexpected, and so, without looking for it, to find our reward. Not less important than the matter I have just referred to is the recent development in microbiology and "all that therein is." The germ theory of disease is not new. When it commenced and who has the credit of its begetting I do not know. Probably, like ancient and modern heroes, it had many parents and as many homesteads. It is quite clear that our own great Harvey entertained it, as may be seen by the following: "Let physicians cease to wonder (he says) at the manner in which epidemic, contagious, and pestilential diseases scatter their seeds and are propagated to a distance through the air, or by some 'fomes' producing disease like themselves, in bodies of a different nature, and in a hidden fashion, silently multiplying themselves by a kind of generation, until they become so fatal, and, with the permission of the Deity, spread destruction far and wide among man and beast; since they will find far greater wonders than these taking place daily in the generation of animals." Years later it was a hobby ridden by many, but without much convincing proof. But even so late as 1886 we find that the advanced pathologist, Dr. Edmund Alexander Parkes, saying, with regard to the etiology of influenza: "We find ourselves in the presence of the so-called fungoid theory of influenza," and, after discussing this matter at length: "It seems impossible at present to come to any conculsion as to the nature of the cause."

The most important fact with regard to recent microbiological research is the gradually increasing appreciation of the fact that these lower forms of life exert, not necessarily mischievous, but indeed benignant influences on the human body, and that although the mode of their operation is not fully explained they take part in healthy processes, assisting normal functions—nay, indeed, it would seem sometimes producing them and warding off the malign effects of other influences to which we are habitually exposed. These bodies, to which we are indebted for this aid, operate partly by their chemic action and partly by what we must call a vital process, and by their cultivation outside the human body and their modification by passing through other organisms can be made to exert a malign or a beneficial agency on man. It seems even in the range of possibility that at some time not very distant some other than the ancient mariner may apply to them the far-reaching words of Coleridge and exclaim :—

> "O happy living things! no tongue
> Their beauty might declare;
>
> . . . .
>
> Sure my kind saint took pity on me,
> And I blessed them unaware."

The third great revelation of the last twenty years is the wonderful protective and curative power of these living products. This, in a very wide sense, is not new. Of all the most powerful agents of destruction the most violent have been derived from living things; they are to be found in the animal and vegetable worlds, not in the mineral. In their most terrible malignity—such as in snake-bite, glanders, or hydrophobia—these need no human skill for their development; they are prepared in the laboratory of Nature, and, alas, are only too ready to our hand. Next to these come the poisons of stinging things, and after them the more slowly operating and less deadly animal infections; some with indeed beneficial influence, as vaccinia; others with local effects on the skin, but not often great disturbance of the general health. The vegetable kingdom can produce potent poisons, such as belladonna berries, aconite root and leaves, poppy juice, and the Ignatian bean; but in order to render these more deadly the hand of man has to come in and prepare nicotine, strychnine, morphine, and the like, just as it may produce, from the mineral or quasi-mineral world, such potent agents as hydrocyanic acid, concentrated acids, and other dealers of destruction. The interest in these facts lies in the modern mode for their utilisation. The great potency of living products has led to very fanciful notions in therapeutics; and there have been those who, to cure diseases of organs, have given portions of the same but healthy organs of animals or of man or other animals. Again, the idea has been pronounced that even excreta were useful drugs, and that the diseased organs of man might effect a cure of those supposed to be afflicted in like manner. Curious as some of these details are, they are of real interest to us only as they lead up, through inoculation for small-pox, to our own Edward Jenner's discovery of vaccination, and then, through the researches of Pasteur and Brown-Séquard, to our present state and plane of knowledge. It would seem now that there is scarcely any limit to what may be expected in the cure or prevention of disease; and the most striking of all phenomena is, to my mind, the probability of rendering an animal immune by the introduction into its organism of a healthy constituent of the body of another. This, if fully confirmed, will be the greatest veritable triumph of therapeutic and preventive medicine, instituted and guided by extended inquiry into comparative anatomy, physiology, and pathology. As in the human race or species there exist, as is well known, what may be termed idiosyncrasies — by which is simply meant that as a matter of fact some people, and some people's families, escape epidemic diseases, whereas they are especially prone to take others to which they may be exposed—so in the great economy of nature certain groups of animals have been shown to exhibit no capacity for taking, or for even being inoculated with the poisons to which others are exposed, and from which they suffer, and that severely. It would seem, therefore, that use may be made of these animals more or less naturally immune from certain maladies, and that their immunity may be partially conferred on man. Quite recently a communication of the greatest importance has been made on the rendering of animals immune against the venom of the cobra and other snakes, and on the antidotal properties of blood serum of immunised animals. This subject has occupied attention during the last six years, and we must all look forward with expectancy and hope to the possible and probable diminution of a great national and imperial calamity.

The outcome of all that I have been saying is this: that the scattered fragments of knowledge and guesses at truth of many years have been gathered into a focus during the past twenty-five years; that the vegetable life, extracting from the mineral world the materials it needs for growth and production of powerful agencies for good in the form of food and medicines, and for evil in the form of poisons, has given itself up to the growth of animal life, with its much more complex organs, and for the cure of ills once thought beyond the reach of human aid; but that, thanks to man's scientific ardour and industry, it has again shown itself to be our servant, our helper, and our protector. These are not dreams of the study, they are facts of the laboratory and of daily life; and in using that word "life" again I must endeavour to emphasise still more forcibly upon you my urgent belief that it is to living agencies and their employment that we must look for help in the care of infancy, the conduct of education —moral, mental, and physical—the training up of character as well as of limbs. These must be the guidance of living functions in the choice of living occupations, be they either of hard work or of amusement; it is to these we must appeal if we would see the *mens sana in corpore sano;* and then it will be to these that we may confidently look for help when the inroads of age or of disease are at hand often to cure us of our trouble; or, if not, to give us rest and peace. It would be absurd in me, now and here, to attempt to say in what this potency of life exists. It is enough for us to recognise its existence, rejoice in its marvellous energy, and anticipate still more from our investigations of its modes of action; but I cannot help feeling that, however far we go in our research into the arcana of nature, one of our ablest neurologists, who has gone very far, is right when he says: "Search while you may, with eyes, however aided and however earnest, that which we call 'life' eludes our search and resists our efforts. We must be content with what knowledge we can gain, secure or insecure, and while using it as best we may, should realise in all humility how much there is we cannot know, and yet we cannot doubt."

There are three aspects of life to which I wish to make further reference, because it seems to me very important that this Association should at some of its annual meetings direct special attention to their consideration. And first a few words on professional life. As physicians and surgeons, however numerous, we do not constitute a "body" of men unless we have some one prevailing spirit common to us all. The profession may include its thousands and tens of thousands, but it is a crowd, a multitude, or shall I say a "mob," unless there is in it an *esprit de corps;* and, thanks to our great seats of learning, our universities and colleges, we have developed this uniting spirit now for many years. But our own special colleges of physicians and surgeons, our medical societies, and especially this vast Association, have done more within the last fifty years to give real, unifying life to its individual members than was possible, or even expected to be possible, by our forefathers. There are sixty branch associations in direct communication with our colossal trunk, spreading themselves not only over the United Kingdom, but to the remotest parts of our dominions; and these are all equipped with efficient officers, holding meetings all over the world, discussing the really important topics of the day, and adding their contributions to the sum of knowledge through the pages of our quite remarkable journal. Now this is very encouraging and very hopeful, but it entails, as it is bound to do, great responsibilities. That so large a body of men should be banded together under one common name means that they have some common purpose, and some common plan of co-operation to attain it. What that purpose is we know—namely, to render our profession of the highest service, not only to the individual, but to the State, by taking our share and giving our advice in the making of our laws, so far as they affect us, as members of our profession; by the regulation of our charities, the guidance and control of labour, the care of the pauper and the pauper child, the lunatic and the quasi-lunatic, or the habitual drunkard; by the care of our poorer brethren; by the advance of scientific researches, and especially of those that require combined efforts and combined funds for their prosecution; by the promotion of useful and stable literature; and by the elevation of all that constitutes the education of the man of science, the physician, the surgeon, or the guardian of the public health. These noble purposes cannot be achieved, nor have any of them been carried to any useful extent, without self-sacrifice, as well as the sacrifice of time, without a consideration of the views of others as well as an assertion of one's own; without respectful regard to the feelings and positions of our colleagues, as well as a due estimation of those which we may occupy; without patience as well as work; and an all-pervading sense of hope in the midst of trying times and in the darkest hours. One thing, in addition, we should all most strenuously try to do, and that is to avoid waste of time. We may use it or sacrifice it freely, but we cannot afford to throw away one moment, whether it be on personal ends, forlorn hopes, foregone conclusions, or threshed-out heaps of seedless faggots. It is in this spirit, I am sure, that we begin our vast meeting in the metropolis, and if we but continue along the lines of conduct our Association dictates, and if in the control of the affairs of our daily life we always bear in mind our belonging to a noble profession, and to a great Association of fellow-workers for its benefit and for the benefit of mankind at large we may hope to see that—useful as it may be now—at some future assembly of our fellows it will not be found necessary to constitute a special section for the discussion of those questions which fall under the category of ethics.

Outside our professional life, but closely mixed with our daily work, is the social constitution, or, as some would call it, the environment in which we have to live and move and have our being. Certainly it has changed much within the last twenty years, and it would be impossible for me to dissect it now and say in what ways we have advanced and in what others we have either retrograded or gone far, far out of the beaten track. The changes on all hands are pressing, importunate, and, I might say, overbearing. They are not seen in the assemblies of such reverend bodies as the Royal Society, the Colleges of Physicians or Surgeons, or in the higher courts of our universities, but may be met with in the courts of law, the park, the theatre, the concert room, the school, the public assembly, the drawing-room, and, last, and worst of all, in the home. It would seem as if "reverence, that angel of the world," had from some regions taken flight, and that in her place were idols, or mocking shadows, or georgeously appareled lay figures. This absence of reverence shows itself everywhere, but perhaps it is possible to classify even such a negative quality and put its leading features under three great categories: (*a*) reverence for all that constitutes the religious element in life; (*b*) for that which is the groundwork of social propriety, and I may say even of decency, as our predecessors would have thought; and (*c*) for the constituted order of relative dignity in family life. Thus, much that now passes for wit, humour, cleverness, or fine and advanced thought may be easily resolved into offences either against the religious sense of others—that is it trespasses in the direction of profanity—or against the long recognised standards of propriety in topics of conversation, literature and art; or sins in many directions against the widest meaning of the old commandment, "Honour thy father and thy mother." If all shades of profanity, impropriety, or rudeness were eliminated from what now passes current in books, in plays, and in conversation, we should, I think, often find little or no humour left, but only a vapid attempt at seeming cleverness, or at best some silly pun. Even the epigrammatic style of writing and talking at which there is so much attempt, especially in the conversations detailed in the modern novel, has generally lost all real point and excellence, and in most instances has degenerated into clumsy efforts to be smart and unintelligible or to gild the refined gold of the setting of that priceless gem of humour when natural and spontaneous, the true "Irish bull." The sparkle of the humour is lost, there is a semblance of a paradox, and wrapped up in this an obvious and often intentional untruth. If this were rare we could let it alone, least of all could we think it worthy of notice in the meeting of this Association; but it is not rare—our literature is positively flooded with this senseless and misguiding nonsense. Even science is sometimes dragged into its degrading service, and the profession of medicine has not escaped its touch. If we ask ourselves, "What is the meaning of this and whence its origin?" I do not think we shall have very far to travel. Of late years there has been imported into our country a phrase which, in my humble opinion, is abominable in itself and in its power for evil. I will not quote it; but let me ask you if you do not think that this idea of the approximation of the "end of the nineteenth century," with the nonsense that has passed into its literature, has not had much to do with it? It may be that the notion has arisen in some minds that when its "crack of doom" has come, and they wake into a new epoch, follies will be left behind, no more records will have to be made or broken, wild oats will be trampled under foot, and no more will be sown; that there will be an end to the frivolous talk of the last decade, that a "new earth" will be here for us to tread, and that if there be any idea of a heaven lurking in such minds, there will be a "new heaven" also. It has seemed to me that something like these notions have passed current in many circles, and have been held to excuse what would otherwise be not only inexcusable but intolerable.

Now, gentlemen, it is against all this absolutely unscientific and unphilosophical verbiage that, I think, we, as members of the profession of medicine, should utter our strongest protest. Nature does not progress by leaps; the terms, limits, and boundaries of time are convenient arrangements we have made for ourselves; to pass them may make or destroy some legal powers or exemptions from responsibility; but they have, in themselves, nothing whatever to do with the essentials of our individual and domestic life. When the last stroke of the bell has knelled in the midnight of London the last hour of 1899, do we really think that either here or there or anywhere it will carry with it any substantial meaning or any wholesome lesson? I cannot for a moment believe it will. Old and young people will die in the awakening as in the dying year; babes will be born in one century and in the next; there will be bridal feasts and funeral marches; wisdom and folly; sickening accidents and more sickening crimes; there will be "new women" and "new men"; but there will also be "old women"—and those of both sexes—and "old men" to tell us of the far better days when they were young and everyone was wise. As physicians and surgeons we can, I think, do much to counteract this, as it seems to me, growing tendency of the present day. In the nursery, in the schoolroom, and yet a little later we would give advice, and that of useful sort. Little girls and little boys may strip themselves as high as may be, and paddle on the sands of the salt sea shore with relative impunity, for they rarely venture into water over ankle-deep; but when a few more years have passed, and, exposed as society now sanctions, they roam on another shore of that "Ocean of Time whose waves are years, treacherous in calm and terrible in storm," they may be overtaken by the tide they have courted, and to them "Life be never the same again."

There is still the one, the greatest, relationship of life to which I will address myself, but only for a brief period—I mean the conduct of our profession to the "religious" element in our nature. Here we have nothing whatever to do with creeds, be they hoary with age or flushed with the bloom of youth; all that I mean is that we, members of the medical profession, have to deal with those to whom these creeds mean much, and are, with what they entail to many, the be-all and end-all of existence. I am not thinking for a moment of the few substitutes proposed for religious faith. I refer only to that which relegates those who entertain it to the Higher Power, to that source of Revelation and of good and hope, far other than is to be found in themselves or in Humanity, be it in the Future or the Past. I am sure that in giving the help we hope and ought to give to suffering and sorrowing man we shall do nothing worthy of the name unless we realise, and that to the full, the importance of this factor in our lives and theirs; and so guide its operation as to help it to hasten, subdue, control and comfort those to whom it is the minister that they feel to be sent from God to help them in their passage through this region of passing shadows to that of realities which are abiding things.

Acting in this spirit in our professional life, and in our relation to the social and religious lives of our friends and patients, we may, I think, take courage, and, entertaining a larger hope from holding a larger view of life, adopt the words of the Laureate of the first half of this century and exclaim—

> " Look forth, my soul !
> (Nor in this vision be thou slow to trust)
> The living waters, less and less by guilt
> Stained and polluted, brighten as they roll,
> Till they have reached the eternal city, built
> For the perfected spirits of the just ! "

THE END

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